RAILROAD GAZETTE

FRIDAY, MAY 1, 1896.

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The Northwestern and the Union Elevated Railroads of Chicago.

Since its inception, in the spring of 1894, we have referred, at intervals, to the granting of franchises and the letting of contracts for the construction of the Northwestern Elevated Railroad of Chicago. Excavation was begun on May 20, 1895, and the work has now reached that stage of progress where a fuller description may be made. One and a half miles of four-track structure is now erected, and six spans per day are being added.

We give liberal illustration of some of the salient features of the road's construction. In the instance of foundation work and expansion joints, comparative illustrations are furnished as taken from other elevated roads of Chicago.

The first survey for location of the route was made in the year of 1894. Two engineering corps were in the field for one year on this preliminary work.

The survey was made under the supervision of Mr. Charles V. Weston, M. W. S. E., who is Chief Engineer of the Northwestern and the Union elevated railroads. The road has purchased a right of way 50 ft. wide for all but one mile of its length, this mile being built in the streets south of Chicago avenue. The adopted route is considered an excellent one. To render apparent the difficulty of making this location without an outlay of money that would have greatly augmented the first cost of the road, it is only necessary to add, in referring to the map of the road, Fig. 1, that the part of the city which is traversed is of the oldest and most thickly built portions of Chicago. Geographically, it is a peninsula, with its obtuse point to the southeast.

It is bounded upon the southwest by the north branch of the Chicago River, upon the east by the shore of Lake Michigan, and is known as the North Side.

The buildings and population on the southwest, or river side of this peninsula, as is the case in the immediate neighborhood of the majority of navigable rivers, are not very valuable, regarding the properties as real estate, and their population as fare producers.

The entire northeast edge along the lake and largely all of that territory lying between the lake and the adopted route is composed of the Lincoln Park confines, and is a valuable exclusive residence district, which, while promising to supply the bulk of the Northwestern's local traffic, is yet too valuable as property to have been made the site of a purchased right of way.

The nice problem, therefore, was that of so locating the line of the road as to strike that happy mean,

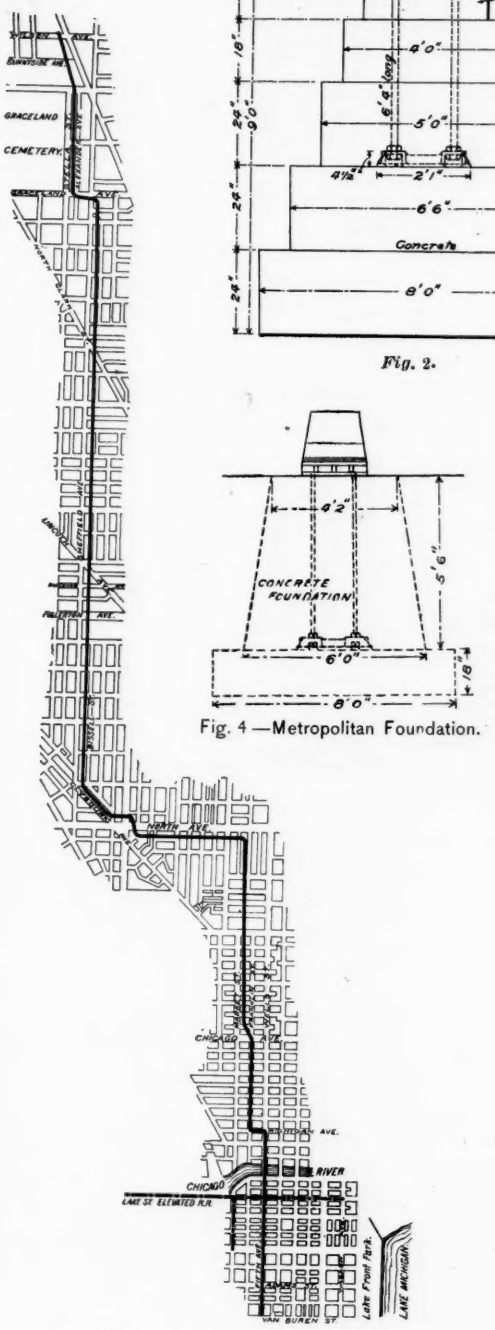


Fig. 1—Map of Northwestern Elevated.

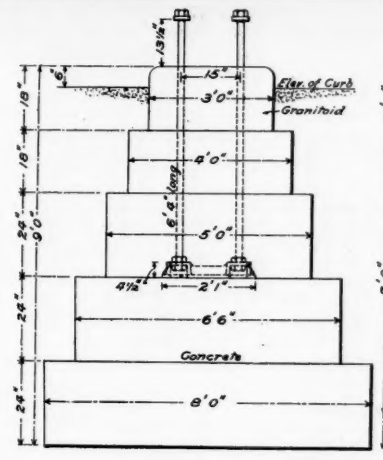


Fig. 2.

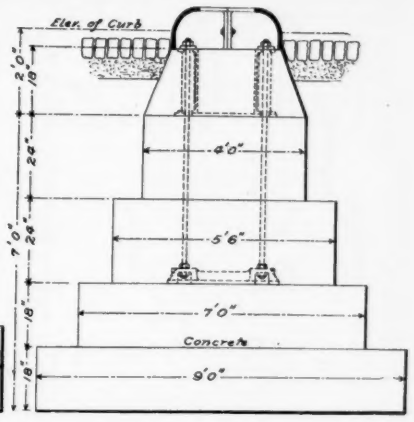


Fig. 3.

Northwestern Foundation.

Fig. 4.—Metropolitan Foundation.

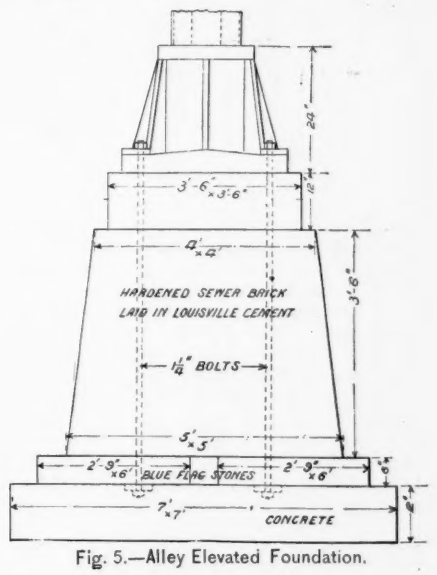


Fig. 5.—Alley Elevated Foundation.

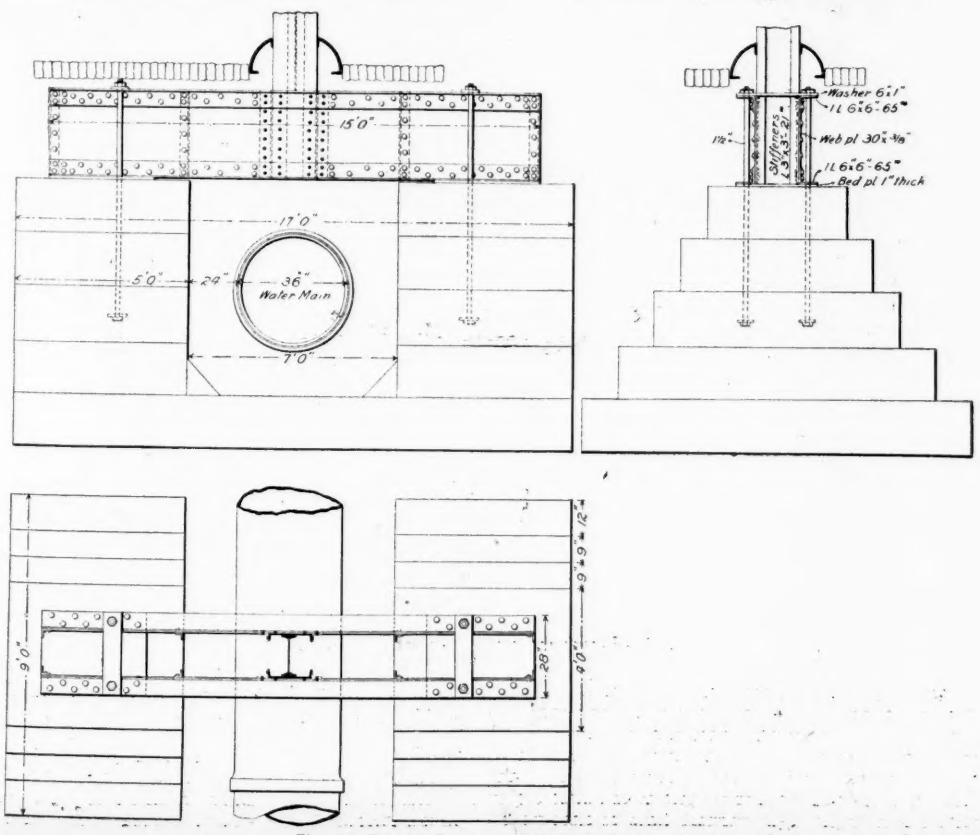


Fig. 6.—Special Foundation in Fifth Avenue.

which, while tapping this badly congested district would yet avoid the condemnation of a too valuable class of property, without isolation from the factories, and the residence portion of the eastern field.

The contract for the foundation work was let, early in May of 1895, to Angus & Gindele, of Chicago. The contract for the structural ironwork was given on Feb. 14, 1895, to the Union Bridge Co., of New York, and the Elmira Bridge Co. of Elmira, New York, and the structural ironwork is being done by these companies conjointly. The entire length of the Northwestern Elevated road from its down-town junction with the Union Loop, at Lake street and Fifth avenue to the terminal yards at Wilson and Evanston avenues, is 6.41 miles, pursuing an ultimate northwest trend by its several departures from a tangent line.

Fig. 2 is a standard pedestal, with anchor bolts, as adopted by the Northwestern. The estimated load on a pedestal is 1¼ tons per square foot. It is built of concrete, the formula for which is 1 of Portland cement to 3 of sand, to 6 of lime stone, crushed to a size that will pass through a 2½-in. ring. Upon a base course of 8 ft. × 8 ft., × 2 ft., four courses are built up as follows: 6 ft. 6 in. × 6 ft. 6 in. × 2 ft., 5 ft. × 5 ft. × 2 ft., 4 ft. × 4 ft. × 1 ft. 6 in., and a finished top 3 ft. × 3 ft. × 1 ft. 6 in., the lower two-thirds of which is of ordinary concrete. The last 6 in. at the top are composed of 1 part of Portland cement, 2 of granite screenings and 4 of crushed granite that will pass through a ¾-in. ring. The sides and top of this final course, 1 ft. 6 in., are faced heavily with neat cement, and the edges are rounded to a radius of 3 in. A cast-iron anchor plate rests on the second base course, and into it are locked two soft steel bolts, 1½ in. in diameter with cold-pressed threads, and nuts above and below the anchor plate. The anchor bolts extend 1.4 ft. above the finished top, and receive the pressed steel sleeve, by which the columnar attachment is made. This type of pedestal is varied, to suit the conditions that are met when the right of way enters the public street

and column points fall outside of the curb line, as in the down-town district.

Fig. 3 shows the most noticeable of the variations. The proportions are here increased to 9 ft. × 9 ft. × 1 ft. 6 in.; base course, 7 ft. × 7 ft. × 1 ft. 6 in., 5 ft. 6 in. × 5 ft. 6 in. × 2 ft.; and a top course of 4 ft. × 4 ft. × 2 ft.; the entire height being 2 ft. less than the height of the street curb

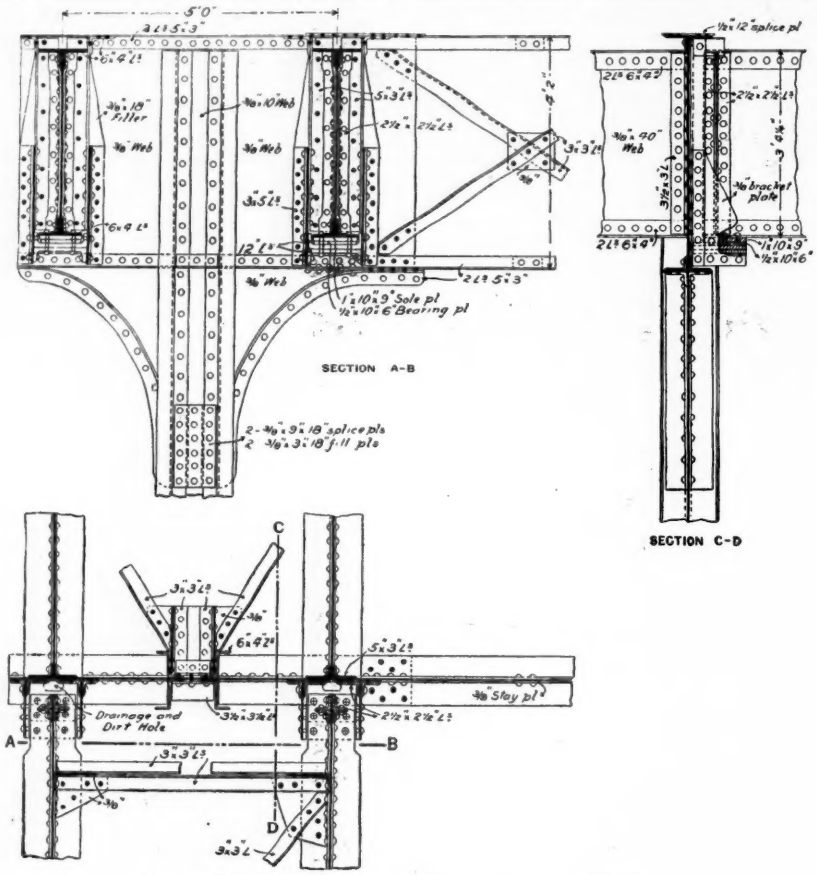


Fig. 7.—Expansion Joint on Tangent, Northwestern Elevated.

line. The method of attachment and the hooding of the pier are self-explanatory, with the aid of Fig. 3. All station and curb pedestals are modifications of the first-described pier.

For comparison of different modes of treating pedestal design, we also show in Figs. 4 and 5 standard pedestals of the Metropolitan and the Alley Elevated of Chicago. The formula of the concrete used in the Metropolitan pedestals is identical with that of the Northwestern Elevated. The base course is 8 ft. × 8 ft. × 1 ft. 6 in. Rising from the center of this course is the frustrum of a pyramid, 5 ft. 6 in. high, 6 ft. square at its base and 4 ft. 2 in. square at its top. The top of the pedestal coincides with the established grade. Anchor bolts and spiders are disposed in a manner similar to that of the Northwestern, except that two shorter bolts of the same diameter, 1¼ in., are also imbedded to a depth of 18 in. in the top of the pier, on a line at right angles to the line of the main anchor bolts, thus making a four point bolt contact with the column. The column rests upon a base casting that surmounts the pier top.

In the illustration of a pier of the Alley Road, Fig. 5, there appears a base course of concrete, same formulæ as above mentioned, 7 ft. × 7 ft. × 1 ft., surmounted as a second course, by a pair of twin blue flagstones 6 ft. × 2 ft. 9 in. × 6 in., upon the under side of which the 1¼ in. anchor bolts are retained by bar washers. Upon this bed of flagstones there is built the frustrum of a pyramid, 5 ft. square at the base and 4 ft. square at the top, composed of hardened sewer brick laid in Louisville cement. The finished top is a block of sandstone 3 ft. 6 in. × 3 ft. 6 in. × 1 ft., and upon it rests a substantial base casting which receives the column. The column is built of two 15-in. channels with their flanges turned inward and latticed together by 4-in. × ⅛-in. steel bars riveted diagonally upon the inside of the channels at a distance of 10 in. from center to center.

Many unusual conditions were met in placing the foundations for the Union Elevated railroad, the relation of which to the Northwestern Elevated system is made apparent under the head of terminal connections. As illustrative of the obstacles encountered in this portion of the foundation work we produce Fig. 6, which shows the plan, side elevation and cross-section of a type of special foundation rendered necessary by reason of there being a 36-in. city water main directly in the longitudinal line of the column points, in the west side of Fifth avenue, between Van Buren and Quincy streets.

The alternative of removing or bridging the water main was presented. Its removal for so great a length in this congested undersurface was deemed inexpedient and the accompanying plan of bridging the pipe at each column point where it was encountered was used. Referring to Fig. 6 it will be seen that a course of concrete, the full width of the double pier was first laid. Upon this base course are built the successive courses which constitute the twin piers. An unbroken vertical face parallels the water main at both sides, 2 ft. at each side of the pipe alignment, 18 in. above and a like distance below it being maintained clear of constructive work, that the pipe may be easily accessible for repairs. A strong fillet is formed at the meeting of the first and second courses, at the inside edges of the piers. Imbedded, to the mid-height of the second bottom course of concrete are two 1½ in. soft steel anchor bolts bearing at their heads, each one anchor plate or washer of plate steel 6 in. × 6 in. × 1 in. Upon these piers is laid a solid web steel box girder 15 ft. long and 30 in. high. Two steel bed plates 3 ft. long - ft. 4 in. wide and 1 in. thick are riveted upon the ends of the girder. The girder is built up of two plates 30 in. × ⅜ in., with a 6-in. × 6-in. 65-lb. angle riveted at the top and bottom edges their full length of 15 ft. Inside corner plates and stiffeners are made of 3-in. × 3-in. 21-lb. angles, as shown, and the whole is bound to the foundations by two bar washers 2 ft. 4 in. × 6 in. × 1 in., that yoke each of the two pairs of anchor bolts at the top To the inner sides of this box girder, at its mid length, is fastened the column, which is made of two channels, with an I-beam for a spreader. To each of the four corners of the column is riveted a 3-in. × 3-in. 21-lb. angle the full depth of the girder, and these angles receive four of the eight vertical lines of close-spaced rivets, which complete the union of column and girder.

This is one of the simpler of the many complex situations that were encountered in the Union Elevated Railroad construction, where a seemingly inextricable network of gas and water-mains, electrical conduit and catch-basins held a priority of location.

The field work of the Union Elevated road, in addition to that of the Northwestern Elevated road, is being conducted by the same engineer corps, and is in the immediate charge of Mr. A. T. Tomlinson, M. Am. S. C. E., who is Assistant Chief Engineer of both elevated railroads. The structural work is the design of Mr. J. A. L. Waddell, M. Am. S.C.E., of Kansas City, Mo., who is Designing and Consulting Engineer of the Northwestern and Union Elevated railroads. Great care has been bestowed upon the minor details of construction with the purpose of eliminating the factors of sway and thrust, which too often rob an elevated structure of its needed stability.

All structure that is built on the private right of way of the Northwestern Elevated railroad will be of the solid-web longitudinal girder type, four tracks wide. It is of medium steel, excepting shop and station construction, the ornamental viaduct work, the cast-iron anchor spiders, and the soft steel rivets and anchor bolts. ⅞-in. rivets are the standard fastening for all of the heavier structural parts. Three-quarter inch rivets are substituted in the lighter supports. The supporting columns are built of four Z-bars 3½ in. × 3½ in. × 6 in. × ⅜ in., assembled upon a single central ⅜-in. web-plate, with their inner edges 3 in. apart, so forming an outside channeled rectangular cross-section, 16 in. × 12½ in. over all. The base of the column is composed of two foot-plates 18½ in. at their tops, 32 in. at their bottoms, 20 in. high, and ⅛ in. thick, riveted to the sides of the column and attached to a steel bed-plate 34 in. × 34 in. × 1 in., by six 6 in. × 6 in. × ½ in. L's., two of which extend the full width of the foot plates, 32 in. In the channels formed by the reverse sides of the column, from the foot plates, two sleeves 14 in. high are riveted to receive the anchor bolts, and are surmounted by plate washers 4½ in. × 4½ in. × 1 in. which receive the retaining nuts.

The columns, in cross series of four, are located 12 ft. from center to center, and rise to the level of the longitudinal girders at their tops under the center line of each track. At the under level of the girder the column is provided with a bracket-spread of 7 ft. 4½ in. in the line of cross-section, to support the web-plates which are interposed between the ends of the longitudinal girders, in the capacity of a modified cross-girder.

This bracket is built of two ⅜-in. web-plates, edged each with two 5 in. × 3 in. 28-lb. L's curved upward to a radius of 3 ft. 2½ in. Attachment of the column and short cross-web is effected by 5-in. × 3-in. 30-lb. L's riveted to column, bracket and web as shown in Fig. 7. Where L ends are brought into contact with the Z-bars of the column, the ends are faced, that the contact may be close and absolute, to thwart any tendency toward side sway or torsion that might develop at these points.

A standard span, length as shown in Fig. 8, is 40 ft. Each longitudinal girder is a solid web-plate 40 in. wide × ⅜ in. thick, to the edges of which, just above flush at top and bottom, are riveted four 6-in. × 4-in. 39-lb. L's the full length of the girder. Vertical stiffen-

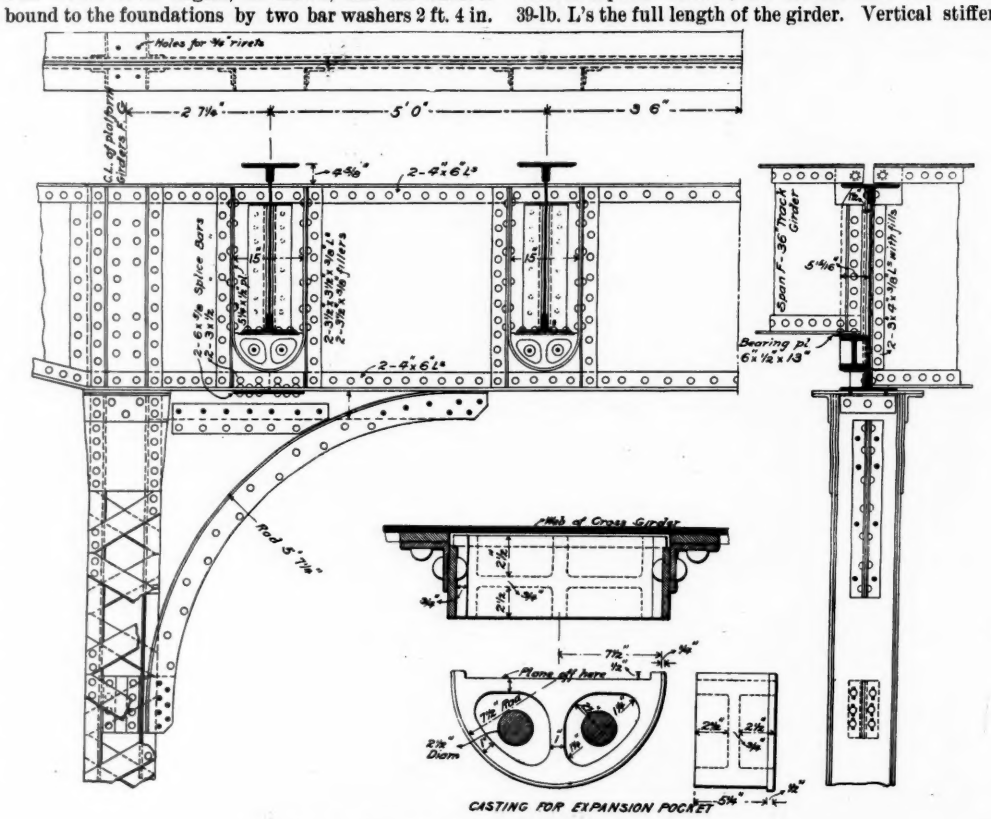


Fig. 9.—Expansion Joint of Metropolitan Elevated.

ers of 3-in. × 3-in. 21 lb. L's are used upon alternate sides at intervals of 3 ft. 3 in. and fastened to the we by ⅛-in. rivets 4½ in. apart. Connecting plates ⅜-in. thick are placed 8 ft. apart on both the top and the bot tom flanges throughout their length.

Surmounting each column bracket is the short web-plate described with the column, and this receives directly the ends of the girders at either side. The method of attachment of girders to columns is by the addition of

two 3½-in. × 3-in. 24-lb. L's at the girder ends. These L's are the full depth of the girder web, riveted upon one face to it, and upon the other to the receiving face of the cross-web, the necessary fillers being supplied to fill all interstices.

The transverse bracing between the lines of stringers is an important feature of this construction, being designed for great firmness. Two 3-in. × 3-in. 21-lb. L's are placed, three pairs to the span, in maltese cross form, the L's meeting back to back with a ⅜-in. connecting plate interposed between, and riveted to them at their intersection. Two 5-in. × 3-in. 30-lb. L's are placed horizontally, back to back, at top and bottom of this cross work, with a ⅜-in. connecting plate at their mid-length, and the whole riveted firmly into one bracing frame, with ⅜-in. connecting plates at the several corners.

At regular intervals between these bracing frames is placed a direct cross brace made of similar angles, and a continuous diagonal line of bracing of the same weight crosses and recrosses from girder to girder upon the bottom flanges. The whole series of cross braces ends in a V-shaped brace which makes direct contact with the column, at either end of the span. The stringers and columns are therefore a fixed and continuous factor, until the expansion joint is reached, once in each four spans.

We have produced for the purpose of comparison Figs. 7 and 9, showing two of the various methods of treating the question of metal expansion, that have been applied upon elevated railroads of Chicago. Fig. 7 shows in plan and cross-section the standard expansion joint as adopted by the Northwestern Elevated railroad. Two 12 in. channels with a web ¾ in. thick, and 9 in. long are placed back to back and riveted together, so forming an I-beam in section, with its length placed at right angles to the web of the cross-girder, or receiving plate as the case may be, and in the line of the longitudinal stringer. They are firmly riveted to a pair of ⅜-in. bracket plates, which are inserted into the angle formed by two L's laid one within the other, and riveted to the cross-web. In the trough of the upper channel is riveted a bearing plate ½ in. × 10 in. × 6 in., planed on the top. Upon the bottom of the stringer is riveted a sole plate, 1 in. × 10 in. × 9 in., planed on the bottom. The bottom flanges of the girder are sheared of their edges to a depth of 1 in., to afford a free entry into the channel. A space of 3 in. between stringer end and cross-web is maintained at a temperature of 70 deg. Fahr., to accomodate the expansion of the four-span lengths here provided for. A prime feature of this arrangement is the reduction of the leverage exerted upon the column by the girder, by making the bearing plate of smaller surface than the sole plate, so throwing the line of weight more nearly upon the columnar center of gravity. This arrangement is maintained upon the entire road, being varied only at curves, in which instances the radius of the curve determines the angle at which the expansion pocket is placed upon the cross-web.

The Metropolitan Elevated Railroad employs the type of expansion joint shown in Fig. 9, but only where cross-girders are a necessity, this road being a distinctively spread top-column structure.

We have here a U-shaped yoke-plate 5½-in. × ½-in. attached to two 3½-in. × ⅜-in. L's, upon two 3½-in. × ⅜-in. fillers, which are riveted to the cross-girder. Riding within this yoke is a segment of a circular cast-iron block, radius 7½ in., planed upon its flat upper surface and flanged at its ends. This block is placed in its yoke before the attachment of yoke and cross-girder is completed, and cannot, therefore, become unseated while the hanger retains its true relation to the girder.

The planed face of the block receives the bottom of the stringer, upon which is riveted a sole plate 6 in × ½ in. × 1 ft. 1 in. The standard expansion joint of this road is a plain slide joint; the base of the longitudinal girder resting directly upon a bed-plate which caps the column. The flanges of the girder are retained in their alignment by overlapping plates at their sides, which, with fillers beneath, permit the free linear action of the span.

The "Alley" Elevated road of Chicago uses four varieties of expansion joint. Three of these are, in principle, modifications of the Metropolitan joint, which is here shown, and the fourth, their standard, is a simple sliding arrangement of the longitudinal girders, upon a plate surmounting the column. Slotted holes in the bottom flanges of the girder accommodate the expansive movement, and an emergency bolt, loosely strung through contiguousgirder ends, provides against any radical departure from alignment or longitudinal location.

(TO BE CONTINUED.)

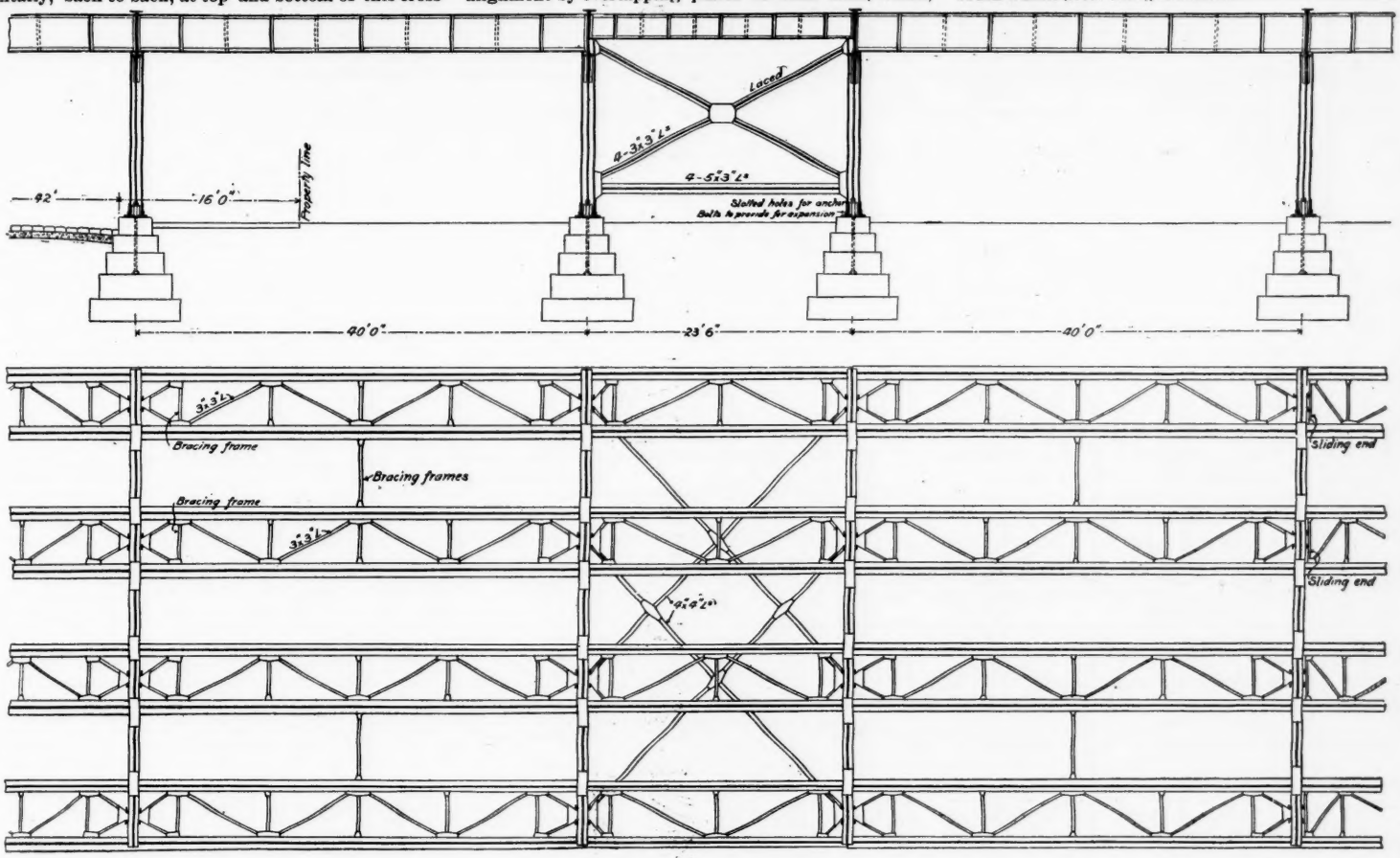


Fig. 8.—Standard Spans and Tower Spans.

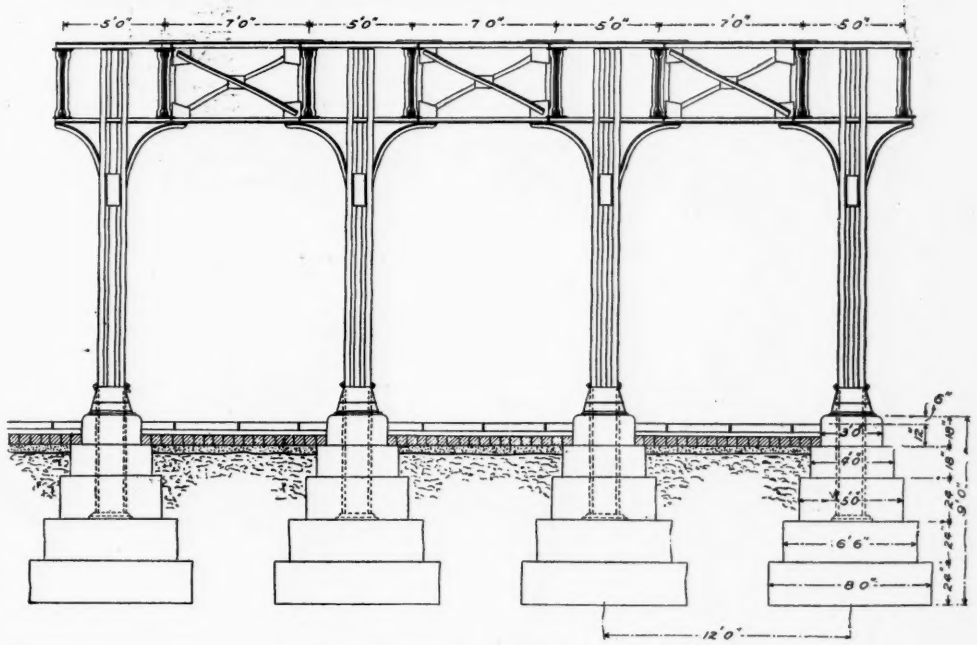


Fig. 8a.—Section of Standard Span

The Baltimore & Ohio Equipment Contracts.

Locomotives.—We are able to give somewhat more definite information than has yet been made public as to the contracts for rolling stock to be let by the Baltimore & Ohio Railroad. The locomotive contract will cover 50 engines, all heavy. Of these 40 are consolidations, six are 10-wheelers, with 21 in. × 26 in. cylinders, and four are 10-wheelers, with 20 in. × 26 in. cylinders. There are many signs that the final orders will be for 75 of these various classes of engines; but these 50 are all of which we have positive information.

The consolidation engines are designed to burn soft coal; their total weight in working order is 163,000 lbs., of which the weight on drivers is 147,000 lbs. The weight of the tender loaded is about 80,000 lbs. Other dimensions are as follows:

Drivers (cast-iron centers), diameter	54 in.
Driving wheel base	15 ft.
Total " "	23 ft. 2 in.
Truck wheels (steel tired), diameter	30 in.
Driving wheel journal	8½ in. × 10 in.
Truck " "	5 in × 8¾ in.
Cylinders	22 in. × 26 in.
Boiler	64 in.
Tubes (246), diameter	2¼ in.
Firebox	114 in. × 39 in.
Heating surface, tubes	2,131.9 sq. ft.
" " firebox	189.25 "
" " total	2,321.16 "
Grate area	30.87 "

The firebox will be provided with a brick arch; the boiler has extended wagon top and extension smokebox the crown bars will be made each of two pieces of wrought iron 6 in. × ⅝ in.; the grate is rocking bar type. The boiler plate is steel, with a factor of safety of 5; butt joints with double cover-strips, and designed for a working pressure of 180 lbs. The firebox sheets are steel, the side and back sheets ⅝ in., the crown sheet ⅞ in., the water space, all around, 4 in., the staybolts 1 in. diameter; the distance from top of grate to the lowest tube at least 22 in. The piston rod and valve-stem packing is United States metallic and the valves Richardson balanced.

These engines are to be equipped with air-brake apparatus and with driver brakes, but no particular brake is specified. The specification for air-brake apparatus is "an approved system of automatic brake apparatus, with 9½-in. pump," and for driver-brake the specification is "equalized air driver brake."

The 10-wheelers differ from each other only in the size of drivers and truck wheels, in the cylinders and in weight on drivers. They are intended to burn coke. The principal dimensions of one class are as below:

Drivers (steel or wrought iron centers), diameter	68 in.
Truck wheels (steel tired), diameter	30 in.
Driving journal	9 in. × 10 in
Truck journal	5 in. × 10 in.
Boiler	60 in.
Cylinders	20 in. × 26 in.
Driving wheel base	13 ft. 4 in.
Total wheel base	24 ft. 6 in.
Weight on drivers	100,000 lbs.
Total weight	136,000 lbs.
Weight of tender about	78,000 lbs.
Tubes (231, diameter	2¼ in.
Tubes about	14 ft. 7⅛ in. long
Heating surface, total	2(65.54 sq. ft.
Grate area	33.3 sq. ft.
Firebox	120 in. × 40 in.
Water space	3½ in. sides, 4 in. front
Stays	1 in. diameter

Grate, rocking finger; boiler to have extended wagon top and extension smokebox and firebox to be provided with brick arch. The boiler is designed for 190 lbs. pressure. The firebox is on top of the frame and sloped so as to make the depth from top of grate to first tube 30 in. In the other particulars than those mentioned here the specifications are identical with those of the consolidation except that these engines are to be provided with an "approved" steam heating apparatus.

The other class of 10-wheelers is to have 78-in. drivers. The cylinders are to be 21 in. × 26 in., the truck wheels 33 in., the driving wheel base 13 ft. 8 in., total wheel base 24 ft. 6 in., and total weight of engine 140,000 lbs. with 110,000 lbs. on drivers.

Cars.—The contract for cars will be for 5,000, distributed as follows:

Box cars	1 800
Coke cars	1,000
Single hopper coal cars	1,800
Double " " "	400
Total	5,000

All of these cars are to be equipped with automatic brakes and automatic couplers, make not specified, and they are to be 60,000 lbs. capacity. They are all to have the American continuous draft rigging. The principal dimensions of the box cars are:

Length over couplers	40 ft. 1¼ in.
" " end sills	36 ft. 10 in.
" inside end girths	36 ft.
Width over side sills	8 ft. 10 in.
Height top of track to eaves	12 ft. 6½ in.
Length, truck centers	26 ft. 10 in.

The cars are to be equipped with metallic roofing according to blue prints and instructions and subject to approval. The doors and their fixtures are to be according to the blue prints furnished, and the grain doors of style and make subject to approval.

The specification for springs is simply the best quality of steel, strictly according to the blue prints.

The specification for couplers is, automatic couplers to the M. C. B. lines, with a written guarantee to replace all couplers breaking under fair usage on account of defects, and to furnish one new knuckle for every two that break. The uncoupling device is to be suitable to the make of coupler used; must not be put under the end sill, but on front face of sill or end of car and subject to approval.

The specification for air-brakes is that they must be interchangeable with those now in service on the Baltimore & Ohio; must be applied according to blue prints furnished, with turned pins or rolled steel pins $1\frac{3}{32}$ in. diameter in $1\frac{1}{8}$ in. holes.

The specification for painting is three coats of Brown mineral paint to conform with the Baltimore & Ohio standard, sample of which will be furnished; the paint to be mixed with the best quality of linseed oil and best quality of Japan dryer.

The single hopper gondolas are to have the following dimensions:

Length over end sills	27 ft. 3 in.
Inside of end planks	24 ft. 9 in.
Width over side sills	7 ft. 10 in.
Length of truck centers	17 ft. 9 in.
Depth of hopper	2 ft. 6 in.

The specification for air-brakes is the same as for the box cars with such modifications of attachment and gear as are necessary for the different type of car. For instance, the blue-print furnished shows the cylinder fastened to the end planks with wrought iron brackets, but "it is desirable to have the cylinder fastened to the sills if this can be done with proper operation of the brakes. The location and arrangement will be subject to approval." A full list of parts of the brake gear forms part of the specifications, and in this the dimensions of the parts are given.

The double hopper gondolas are to have the following dimensions:

Length over end sills	36 ft. 2 in.
Length inside end planks	34 ft.
Width over side sills	8 ft. 6 in.
Length, truck centers	26 ft. 2 in.
Depth of hopper	2 ft.

The specifications for air-brakes contain some special clauses. They call for a special freight-car brake with front cylinder head having jaws for levers similar to passenger car equipment and center of holes 5 in. from outside of head; the brake leverage arranged as in the Hodge system, but the floating levers anchored at one end, converting them into fulcrum levers for the air-brake. An improved arrangement of independent hand-brakes is used which consists of a supplemental floating lever with a flexible connection to the top truck rod and the other end connected in the usual manner to the brake shaft with also a connecting rod from center of floating lever to connect with air-brake rod at cylinder lever on push rod end of cylinder. This arrangement makes the hand brake independent of and supplemental to the air-brakes, and the application and efficiency of the hand brakes will not be affected by the application, release or failure of the air-brakes.

All of these various specifications for the three classes of cars contain very full lists of castings, forgings and lumber, with dimensions, also lists of numerous drawings of the special parts. In these respects the specifications are very complete, but from the beginning to end no maker's name of any part or material is mentioned.

The trucks have 5 ft. wheel base, are 6 ft. 3 in. between centers of journals and have 4½ in. × 8 in. journals. They are of the diamond type with inside brakes. The spring plank is a channel bar 12 in. wide, $\frac{7}{16}$ in. thick and 2¾ in. flange. This truck is to be equipped with metal brake beams, the dimensions, style and maker to be decided upon before the contract is signed. The fulcrum bar is to pass over the top of the spring plank. The M. C. B. standard Christie shoe will be used.

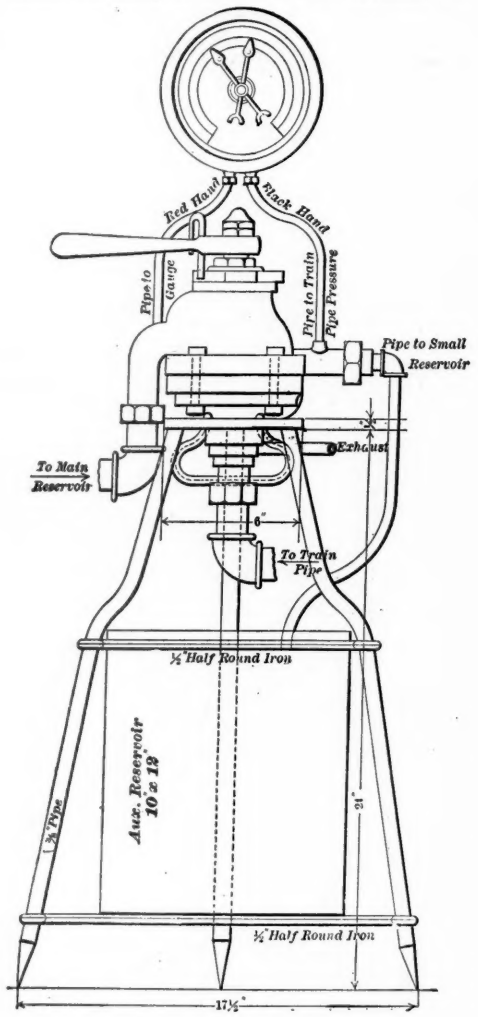
The top arch bars are to be 1¼ × 4 in., the inverted arch bars 1 in. × 4 in, the pedestal tie bars ⅝ in. × 4 in., all of wrought iron, drilled according to drawing, and no punching will be allowed. Here as elsewhere in the specifications the springs are required to conform to blue-prints and the truck springs must be guaranteed for five years' service.

The journal bearings are to be lined with soft metal and are made to conform to the drawings furnished. The journal boxes are to have cast-iron journal bearing keys, pressed steel or malleable iron lids, the lids to be secured with ⅝ in. turn pins to fit the boxes neatly. Drawings for these details are also furnished.

The Air-Brake Men's Association.

(*Concluded from page 284*)

We conclude from last week our report of the Boston convention of the Air-Brake Men's Association. A committee consisting of Messrs. W. F. Brodnax, W. I. Steele, E. G. Desoe, H. C. Frazer, C. C. Farmer, D. L. Barnes and W. H. Durant, made a report on the



Preston's Stand for Brake Valve for Yard Tests.

MAINTENANCE OF PASSENGER AND FREIGHT BRAKES.

An abstract follows.

That we may be able to reclaim and maintain brakes in good condition, a sufficient number of competent men must be employed—not only must they understand the principal of the brake, but must be so far educated in this line that they may, by watching the action of the brake, be able to locate defects; and when this is done, the worst part of the situation has been mastered. These men cannot be gotten—they must be made. The demand for good air-brake repairmen is rapidly increasing, and roads are glad to retain good men, hence it becomes necessary to educate your own men. If you have an instruction car, or even an instruction room, call in all available car repairmen or greasers—men that will consider the air-brake repairman's position a promotion. Instruct them by cut section and follow this with an active brake, in which defective parts may be substituted. Use the utmost patience, for as a rule they are not the brightest; but work with them the hardest and long, and when they once get the information, you will find that they retain it wonderfully well. Examine them and keep a record of their rating, and when you are in need of a man you have only to choose.

Next, and all important, are test plants: all freight house tracks should be piped. The advantage of a tide water terminal for brake repairs cannot be overestimated, and it is here that our energies should be exerted to the fullest to get a complete testing system. Wharf tracks should be piped, for the same reason as explained with regard to freight houses. Tracks for outgoing, as well as incoming trains, also a repair yard to which coal and other cars that are returned empty may be transferred for such repairs as may be found necessary upon inspection.

And last, but not least, the repair track. It is here that we are not rushed for time. The repairs to a car, however slight, nearly always consume more time than would be necessary to put the brake in first-class condition.

The accompanying cut gives what your committee considers a satisfactory arrangement for yard test plant. One-inch pipe is used and it would be well to state that 1 in. pipe can be boxed and laid with plug and box complete, as shown in cut, for $9.75 per 100 ft

A suitable brake valve to be used, with test plant, is our next essential need. One of the principal things to be considered is lightness. Your committee would recommend the valve here illustrated, which is self-explanatory, but may be briefly described as follows: A light steel frame, on which a *B* 11 valve and gage are mounted; a pipe passing through supports frame, and with an ell and short section of pipe placed in pin hole of coupler, brings the valve into a convenient position to be coupled to air hose of car. With coil of hose carried, then connect valve to plug of ground line, and all is complete for testing one or many cars. The weight of this valve complete is less than 20 lbs. Quite a useful attachment may be made to the valve for detecting defective or loose triple piston packing rings. It is as follows: Holes should be drilled into both main reservoir and train line branches of the valve, and a section of ¼-in. pipe connecting these two holes, with a stop-cock located in pipe. Main reservoir and train pipe may then be connected or disconnected, at the will of the operator, while the handle is on the lap. This gives the operator the opportunity to feed air very slowly into train pipe in order that he may be able to test for loose and ill-fittting tripple piston packing rings. This test is explained fully under the head of "Yard Tests."

With the *B* 11 valve we are, of course, deprived of the equalizing feature, and should it be thought of sufficient importance, a very convenient stand can be made for a *D* 8 valve, all complete, weighing little more than valve and equalizing reservoir combined, and which is herewith illustrated. For print we are indebted to Mr. H. L. Preston, M. C. B. of the C., St. P., M. & O. Railway. The same feature referred to in *B* 11 valve for testing triple piston packing rings can also be arranged for *D* 8 valve. Remove excess pressure valve spring, drill and tap through nut, and put in a thumbscrew. This can, by tightening, hold excess valve to the seat. After a reduction is made, bring the handle to running position; it is then only necessary to back thumbscrew slowly in order to have the pressure in train pipe rise slowly and steadily, and giving us the required test. And again, here is another arrangement for mounting the *D* 8 valve that possesses many good points. The valve and hose reel arranged on wheelbarrow frame, and when ready to test the barrow is placed over a plug in ground line and coupled to same. Then as much hose as is necessary to reach the car is reeled off, and the coupling made to car, while the other end of the hose is so fastened to reel that it can be attached to valve, even though a very small quantity of hose is in use. This barrow is also arranged to carry an extra triple valve, tools for cleaning and oiling cylinders, etc.

A repairman and helper should work together. They should have a complete outfit of repairmen's tools, a set of wrenches to suit all nuts, unions, stop cocks and angle cocks. They should also have an outfit of pipemen's tools, and they will, in a short time, be able to do the work of a regular pipeman. It is well known that one man can do very little of this line by himself. A helper can be taught to do the work of a regular repairman; while one is cleaning and oiling cylinders, the other can be doing the same for triple valves. They should also have that very efficient device furnished by W. A. B. Co. for removing pistons from cylinders; if not, they should have a pair of clamps so arranged that piston sleeve and cylinder head may be clamped together for removal. Triple gaskets, hose gaskets and emergency valves should be carried by the repairman to replace defective ones, but for refitting rings, seating slide valves, etc., triple should be replaced and sent to shops for repairs. Every well arranged shop should have a place set aside for air-brake work.

Not over ten cars should be used at once in making tests. With 90 lbs pressure, allow ample time for auxiliary reservoir to equalize with train pipe, then place handle of brake valve on lap and notice closely the gage hand of train pipe; the rapidity with which it falls back indicating the amount of leak in the train pipe. The leak should first be remedied before further tests are made. Next, with full pressure, make a 30-lb. reduction and place handle on lap position quickly, and measure the piston travel on each car, chalking the same on cylinder head. Let the brake remain on, and after five minutes commence at car No. 1 and again begin to measure, and by comparison with measurements, any leaky cylinder may be detected by piston having gone back into cylinder. When this movement exceeds ½ in. the leak must be remedied. Brakes must next be tested to see that all release promptly. This is done by slowly feeding air into the train pipe by an attachment to the brake valve before described, and if after an increase of 20 lbs. the brake refuses to release, the difficulty should be located and repaired. Such failure is generally caused by loose piston packing rings. The air passes the piston, and therefore fails to force it to the release position. To test the check valve in quick-acting triple, apply the brakes and then draw all the air from the drain pipe, and if after five minutes the brake is found off that stayed on during the two previous measurements of piston travel, the check valve must be examined, and if found defective, repaired. With 70 lbs. pressure and brakes fully applied with service, piston travel should be adjusted to suit the requirements of the road. Passenger trains should be thoroughly tested before leaving coach yards, and when line engine is finally coupled to same, it will only be necessary to see that stop cocks are open.

Where the construction of the car will permit it, all classes of brake levers should be the same. Truck levers, both live and dead, should be the same. Cylinder

levers should be the same total length, also floating levers, but graduated so as to be included in certain series of weights into which the cars should be divided.

In opening the discussion Mr. Brodnax, the chairman of the committee, gave a short résumé of a test that he had made in the transmission of pressure by compressed air. He had two tanks of 100 cu. ft. and 40 cu. ft. capacity respectively. They were a half-mile apart, and connected by a ¾-in. pipe. A pressure of 90 lbs. per square inch was put in the larger, and the valve opened. In the smaller tank a

Pressure of 10 lbs.	was obtained	in	20	seconds.				
" " 20	"	"	"	"	50	"		
" " 30	"	"	"	"	1	min	35	sec.
" " 40	"	"	"	"	2	"	25	"
" " 45	"	"	"	"	3	"	0	"
" " 50	"	"	"	"	3	"	35	"
" " 55	"	"	"	"	4	"	0	"
" " 60	"	"	"	"	4	"	50	"
" " 61	"	"	"	"	6	"	0	"
" " 67	"	"	"	"	7	"	0	"
" " 76	"	"	"	"	12	"	0	"

at which points the pressures equalized.

The discussion was quite lively regarding the reports of defects, and the use of defect cards.

Mr. Farmer distributed a blank used on the Northern Pacific system for the inspector's report on slid flat wheels, from which it will be seen that the condition of the air-brake is considered a matter of great importance in fixing the cause of this undesirable condition.

would be nothing to indicate, upon the arrival of the car at a terminal, as to the reason why it had been cut out. The defect card accompanying the report was criticised on the ground of the small number of defects scheduled.

Mr. ALEXANDER stated that on the Pennsylvania Railroad a defect card was used, but that many repairs were made that were not carded. There is a system of cross checking, which holds both inspectors and repairmen well up to their work. A blank, known as No. 217, is filled out and sent each day by the inspector to headquarters, where it is compared with the report of the car repairmen as to the work they have done, and if they fail to make the repairs called for by the inspector's blank, then an investigation as to the reason therefor is made, while a similar inquiry is instituted if inspectors fail to report the necessity for the work that the repairmen say they have done.

In the care of brakes the drain cup of the triple valve should receive due attention, for if it is neglected and allowed to become foul the work done will be unsatisfactory. There are also some cars still running where a sponge is used and where this is allowed to become solid with dirt it will be impossible to clean it with a wire brush, as recommended in the report of the Committee. In such cases it is necessary to remove the sponge. The

applied for test, he will signal by raising his hand above the head and swinging the arm slowly in a horizontal circle several times, or until recognized.

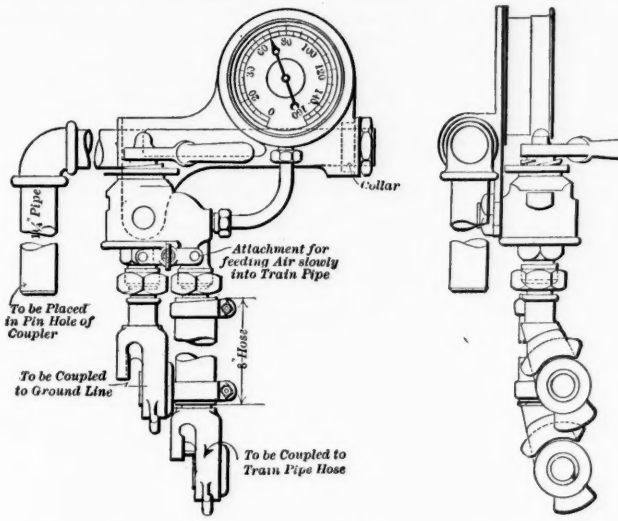
This will signify to the operator to apply the brake by a service application of 10 lbs. reduction. Should a harder application be desired after the brakes have been applied, the signal should be repeated. This will signify to the operator to make a further reduction of 10 lbs. If desired, this may be repeated until all the air has been exhausted from the train line.

To release brakes after test, or at any time, the inspector will signal by raising his arm straight above the head and held stationary. This can be repeated several times, or until brakes are released. The operator should not again apply the brake when signaled to do so unless the car or cars have been recharged to 70-lbs. pressure, when he should give the signal as before

When the inspector wishes to have the brakes applied in quick action, he will signal by raising his hand above the head and swinging the arm in a horizontal circle quickly, and repeatedly reverse the direction of the signal. This will signify to the operator to apply the brakes in emergency.

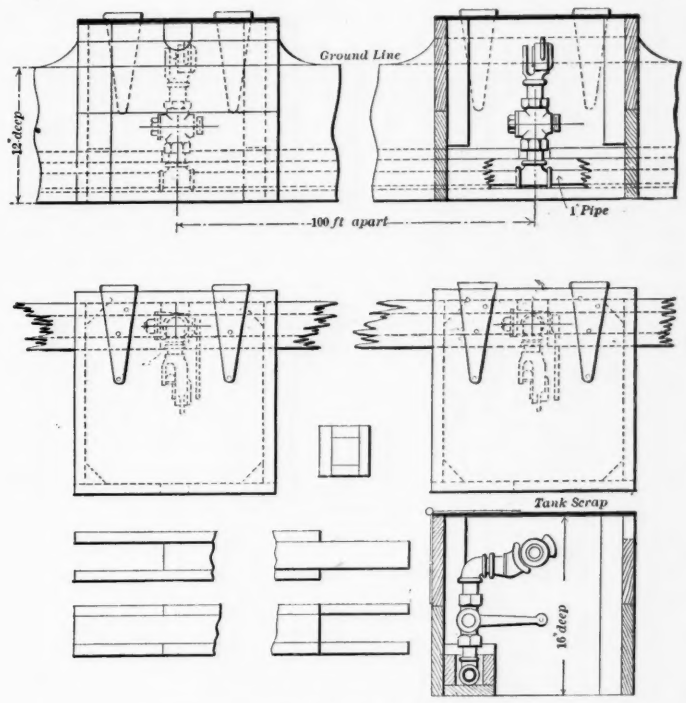
To test car discharge valve on passenger cars four separate pulls on the signal cord should be made from each car, and the operator at signal valve and air whistle must note that no more or no less than four blasts of the whistle are sounded each time; or if not correct, inquiry must be made as to the cause, and when found and corrected, the test must be repeated until correct signal can be obtained.

After the engine is coupled on and the passenger train is ready for test, the inspector should go to the engine, and request the engineer to apply the brakes for test.


¼" Pipe
Collar
Attachment for feeding Air slowly into Train Pipe
To be Placed in Pin Hole of Coupler
6 Hose
To be Coupled to Ground Line
To be Coupled to Train Pipe Hose
1¼" Pipe
Steel Frame ¼" Thick

Portable Brake Valve for Yard Tests.

With Report of Committee of Air-Brake Men's Association.



Arrangement for Testing Brakes in Yards.

With Report of Committee of Air-Brake Men's Association.

NORTHERN PACIFIC SYSTEM—INSPECTOR'S REPORT OF SLID FLAT WHEELS.

To Road Foreman of Engines.

Car No. and Initials....., Kind....., Date received....., Train No..... .....Eng. No. or Nos..... ....., Conductor....., Engineer....., No. pair wheels slid flat....., Length of spots....., Were spots new or old?..... Were wheels removed or passed?....., Piston travel on car....., State whether new quick action, old quick action, or plain triple valve....., Light weight of car..... ..... Was triple valve clean and properly oiled?....., Was triple piston packing ring a good fit in its cylinder and free in the groove?..... ..... , Did triple valve leak at exhaust (Retaining Valve)?....., If so, state cause....., Would emergency and check valves stick when forced together? ....., Would brake apply properly with a gradual reduction? ...., Would it release with a slow raise in train pipe pressure? ....., Would retaining valve operate properly? (See instructions).....

Remarks.....

Dated ....., Station.....

.....Inspector.

Rules for Filling out Inspector's Report of Slid Flat Wheels.

1. This report must be forwarded on the same day that slid flat spots are observed.
2. It is not intended that very small or old spots should be reported, but every case should be where spots are new or wheel removal is necessary.
3. When one or more pair of wheels are removed from a car on account of sliding, report the condition of all the other braked wheels of car.
4. In the removal of wheels inspectors will, as heretofore, be governed by the M. C. B. rules.
5. Pressure retaining valve should be tested in both positions, and it must be noted particularly whether in retaining position, and after a full application and release of brake, it will permit cylinder pressure to reduce but not entirely escape.
6. In case the necessary information cannot be got otherwise, the inspector shall endeavor to obtain an air-brake engine to test brake with before any repairs are made.
7. Under head of "REMARKS" state fully the conditions surrounding every case of slid flat wheels reported, your opinion of the cause, and any information that can be obtained from the conductor. Also what changes, if any, were made in brake rigging, tripple valve or other parts.
8. On proper diagram below show lengths of lever arms. If style of brake rigging on car is not indicated by one of these diagrams, make sketch where indicated that will give necessary lever measurements.
9. Inspectors will attach Defect Air-Brake Report (Form 799) for train containing slid flat wheels.
10. Indicate on diagram by "x" the location of slid flat wheels.

He (Mr. Farmer) also advocated the use of the defect card on the ground that unless they were used there use of a heavy perforated plate was also recommended, and this can be taken out and washed in lye once every six months.

There was some complaint of the carelessness with which many brakes are applied, especially to freight cars, in which the designer seems to have been perfectly oblivious to the fact that repairs will follow use as a matter of course.

The use of leather gaskets was also touched upon. Mr. Hawkes, of the Chicago & Alton, said that they used nothing but metallic gaskets on the engine attachments and leather on the cars. The pipes were put up in gasfitters' cement and had been for the past 22 years. Others also reported leather as being preferable to rubber.

On Thursday the meeting was called to order promptly at nine o'clock and the Report of the Committee on Air-Brake Signals read. The Committee consisted of Messrs. Alexander, Kolseth, Desoe and I. H. Brown. An abstract follows:

AIR-BRAKE SIGNALS.

We are satisfied that a uniform code of signals and inspection would be beneficial. For prompt train movement it is absolutely necessary to have the work of testing the air-brakes conducted systematically, and in a way that will cause no unnecessary delay. To secure these results and provide for the proper care of the brake and signal apparatus, it will be necessary to divide the work into two distinct methods, one of which will be called a yard test, and the other a terminal or road test. By the latter is meant when train is made up and road engine is attached, and is simply to prove that the yard test has been properly made, and to ascertain that all angle cocks, both signal and train line, are open between engine and rear car. And we would recommend that at terminals a record of the piston travel and general condition of the brakes be kept

To expedite the work connected with the testing of brakes at yard tests, we would recommend a signal by which the operator, *i. e.*, the man at the brake valve, can notify the inspectors working about the cars when the car or cars to be tested are charged to 70-lbs. pressure. For this purpose the operator will signal by raising his arm so as to point away from his body at right angles to the direction from which the signal is expected to be seen. This signal can be repeated several times, or until recognized.

When the inspectors are desirous of having the brakes

While we recognize the point taken by some of the members that the air signal should be used from the car next to the engine to have the brakes applied, as having some merit, yet we believe it will be found more satisfactory to have the inspector go to the engine for this purpose, so that when there is any trouble with the train pressure failing to equalize properly, the engineer and inspector, both being at the engine, will be the better able to locate the trouble. And, furthermore, all air signals given from the first car will not be a proper test of the condition of signal valve on engine. The condition of the signal valve should be looked after by a test at the engine house, as recommended on pages 93 to 96, inclusive, in the report of the Proceedings of the 1895 meeting, and the car discharge valve on each car should be looked after at the yard test before being placed in train service.

After the brakes have been applied, the inspector, starting from the locomotive, should pass to the rear of the train, seeing that each brake shoe is set, that the pistons move out the proper distance, and that there are no leaks or other defects.

The signal to release brakes after test will be four blasts of the air signal whistle, given from the platform of the rear car by use of the signal cord. The signal to release brakes after test must never be taken by engineers as notice that brakes are tested and in good condition. A test of the brakes is not complete until the inspector has re-examined the brakes, as quickly as possible, to know that they have released properly.

When found necessary to repeat the test application of the brakes on account of defects found while passing along the train, the same may be communicated to the engineer by a signal, raising his hand above the head and swinging the arm slowly in a horizontal circle several times, or until recognized. This motion is supposed to imitate the movement of a brake wheel. In such cases the release of the brakes must be had by using the air signal as before mentioned.

The practice of using the stopcock on end of signal pipe on rear car, to signal to the engineer to release the brakes after test, cannot be too strongly condemned, as this practice gives no information as to the condition of the signal valve on engine, which fact should be a part of the record of the testing of brakes on passenger trains.

Due consideration has been given as to the necessity of having a train air signal, by which the trainmen could signal the engineer to supply more steam to train for steam heat, your committee would recommend that no air signal be used for this purpose.

To keep the air signal apparatus in good condition, we would recommend that any air signal whistle that requires an answer signal from engine by steam whistle —that the engineer would give the answer signal only

when the proper number of blasts of the air whistle is heard. This advice must not be understood to mean that engineers will disregard the intended meaning of any signal that may be given. But investigation will show that many engineers make a custom of answering an incorrect air whistle signal by the proper steam whistle signal. This is bad practice, and is the principal cause of trainmen not giving the correct pull on the signal cord when giving air signals.

When ready to test the air-brakes on the freight trains the inspector or trainmen should go to the engine and notify the engineer to make a test application of the brakes. At the same time the engineer should be informed as to how many air-brake cars are to be tested. The engineer, having this information, will carefully note if there is the proper discharge of air from the train line by way of the equalizing discharge valve when applying the brakes.

Where freight trains are fully equipped with air-brakes, it will be necessary for two or more men to assist or work together while testing the brakes. To cover such conditions, there is a demand for a signal to show when train is ready for test. We have recommended a signal for this purpose, and we are of the opinion that a signal of this kind does not require any answering signal. It is believed that better results will be obtained, that the signal of one man should be seen and answered by the same signal as soon as it is recognized. In this manner the same signal will be carried along between any number of men.

To test the brakes, one man will start from the engine toward the rear end, the other man start from the rear end toward the engine, and when the men come together they can satisfy themselves as to the condition of all the brakes, and if satisfactory, the man starting from the engine will signal the engineer to release the brakes by giving signal No. 4 in code.

When it is necessary to make a second application of the brakes, a signal to the engineer to apply the brakes can be made by using signal No. 2 in code.

To release brakes after testing or at any time, the inspector or trainmen will signal by raising his arm straight above the head and holding stationary. This can be repeated several times, or until brakes are released.

After brakes are released the inspector should return to the engine and notify the engineer if any brakes are cut out, and give him a general report of the condition of the brakes.

When between terminal points a train has been parted for any reason, after it has been coupled again, the engineer, on receiving the proper signal, will make a service application for test. The trainmen, stationed at the rear end of train, seeing the brakes apply, will signal for the release of the brakes, which, if the latter takes place, indicates that no cocks in train pipe have been left closed.

For yard and road tests there should be an O. K. signal that can be given by man stationed at rear end of train to the next man, and so on to the engine.

A signal for this purpose has been arranged for. Your committee would recommend that engineers should not apply a brake for a test at any time, or release after so applying it, until proper signal is given to do so.

Code of Signals to Govern Yard and Terminal Tests.

Signal 1. Train Charged.—Arm raised, pointing away from body and at right angles to direction from which the signal is to be seen. This should be repeated several times, or until recognized.

Signal 2. Apply Brake, Service Application (10 lbs. reduction).—Arm raised above the head and swung slowly in a horizontal circle.

Signal 3. Apply Brake, Emergency Application.—Arm raised above the head and swung quickly in a horizontal circle, repeatedly reversing the direction.

Signal 4. Release Brake.—Arm raised straight above the head, and repeated several times, or until released. Train with train air signal in use, four blasts of the whistle, to be given by use of the signal cord on rear car.

Signal 5. Brakes All Right.—Arm raised above the head and swung crosswise to track.

All signals to be the same by night with lantern in hand.

Engineer's call for signals, four light blasts of steam whistle.

Engineer's answer to any signal, two light blasts of steam whistle.

Concerning the matter of air signals for train movement, we find it hard to agree on a satisfactory code, so we have concluded to condense the great number of suggestions made to the committee into two groups of signals, and present them as a majority and a minority report, so that the association will have full information on this subject, and we would request that this meeting decide as to which of the signals shall be recommended for train movement. [These we do not reprint.]

Through a slight misunderstanding between the members and the committee the report was at once received and the committee discharged without any time being allowed for discussion.

The last report to be read was that on main reservoir and connections. The committee consisted of Messrs. Farmer, Casey, Nellis, Phillips, Conger, McLaren and Hickey. An abstract follows.

MAIN RESERVOIR AND CONNECTIONS.

The primary object of the main reservoir is to store up a sufficient amount of air to enable the train pipe pressure to be quickly raised to, and maintained at a sufficient pressure to insure a prompt release of applied brakes, and a quick charging or recharging of auxiliary reservoirs. A failure to properly perform this object results in, trains breaking in two, delays through inability to start, hard pulling trains and skidded wheels, decreased safety through inability to quickly charge auxiliary reservoirs, possible collisions, runaways, and increased heating and wear and decreased efficiency of the air pump.

The paramount consideration in designing main reservoir should be volume. On grade work on one of the Northwestern roads where trouble was had continuously with air pumps heating badly, burning out packing, and inability to properly recharge trains, an additional main reservoir was put on, thereby doubling the capacity, and the troubles were entirely eradicated. For after this change had been made, the train could be charged up quicker when first made up, thereby decreasing delays at terminals and points where cars were picked up with empty auxiliary reservoirs. No more trouble was experienced with excessive heating, and when going down the hill the train could be easily recharged to standard pressure before the speed had increased any considerable extent, where previously this was impossible.

In all cases of emergency where from danger, break in two, bursted hose or use of conductor's valve, an especially heavy reduction has been made in train pipe, and when, as is often the case, it is very necessary that a quick release is made, the large volume is found indispensable.

Another detrimental feature due to small volume in main reservoir is, on account of the higher excess pressure needed, more wear to the rotary valve and seat and a harder handling brake valve.

As is well known, the air when compressed contains more or less moisture in suspension, which after compression tends to precipitate. The moisture will not condense, however, until the heat, always incidental to compression, has had time to radiate. To have this take place most effectively, the air should leave the reservoir at the highest and most distant point from the inlet, also that the flow through the reservoir be slow and a large radiating surface be had. The large reservoir fills the last two requirements, and a little forethought in locating the connections the others.

Dirty engineers' valves and signal reducing valves, and water in triple valves, are the unnecessary and undesirable results of closely connecting the inlet and outlet to each other. The best arrangement to obviate this trouble is where more than one main reservoir is employed, and the air can be discharged into one and drawn from the other.

The Sweeney device, named after its inventor, Mr. Thomas Sweeney, an engineer on the Southern Pacific Railroad, is designed to charge or assist in recharging when descending heavy grades. It consists of a pipe from the steam chest to the main reservoir, in which is located a cut-out cock, a safety valve and a non-return check. It is operated by opening the cut-out cock and reversing the engine (with steam shut off), the cylinders acting as compressors, forcing the air into the main reservoir. The device is very handy wherever the pump is unable to furnish sufficient air, but its use is very objectionable for the reason that it draws its air from the smoke arch, and it is accompanied by so much heat and dirt that gaskets and oil in engineer's valve are burned out. Also the valve and triples are made dirty, and moisture is deposited in the latter. It should be connected as far from the main reservoir outlet and be used as little as possible. When necessary to use it air should not be compressed rapidly, and it is best, before putting engineer's valve in charging position, to fill the main reservoir to a high amount, which can readily be done, as the safety valve cannot entirely relieve the cylinders at what it is set.

Recapitulation.—The advantages of the large main reservoir are:

1st. Less delay in getting train charged for testing.

2d. Increased safety through ability to quickly release and recharge after any application, whether for stops, holding down grades, terminal tests, break in two, bursted hose or emergency application caused by engineer or trainmen.

3d. Increased life of air hose and air pump, combined with greater efficiency of the latter, and also decreased wear and better performance of engineer's brake valve.

4th. Less ability for triple valve to delay in releasing, and consequently wheels to slide.

5th. Less moisture in triple valves and consequent freezing up in winter.

For reasons given in the foregoing we would recommend:

1st. That the capacity of main reservoirs be made greater than now generally employed. Twenty thousand cubic inches or over for freight and passenger.

2d. That where practicable, they be placed on engines and not on tender.

3d. That the air inlet and outlet be separated as far as possible, and the outlet be at the top of the reservoir.

4th. That but two connections to the main reservoir be made.

5th. That where possible, the pipes leading from pump to reservoir have a gradual incline for drainage toward the latter.

In the discussion a reservoir of 15,000 cu. in. capacity was stated to be too small, and in one case such a capacity was increased by the addition of a supplementary one to 30,000 cu. in. with the most satisfactory results, while on some new engines (consolidation) of the same class it has been increased to 40,000 cu. in.

A case was cited where a reservoir, having been allowed to become half filled with water, and the delivery pipe leading out just above this water level, the moisture carried out had been sufficient on a cold winter's day to freeze, in succession, every car on the train, and the division terminal had been entered with every one cut out and the whole braking power of the train inoperative. This and the use of connections that are too small was very strongly emphasized.

TOPICAL DISCUSSIONS.

The regular work of the convention being finished, topical discussions were declared to be in order. The subject of air-brake whistles was again brought up. There was a diversity of opinion relative to the desirability of using the one long blast. Those opposing it maintained that it was very likely to occur from accidental reasons. Thus on sharp curves the hose might be drawn out tight and the coupling opened so that on the engine a long blast would be heard when there was really nothing the matter on the train, and delay would result from any attempt to locate the difficulty. Then a slight crack in the hose or a leak in the pipes would do the same thing.

On the other hand it was urged that if the hose between the cars was so short that it would open on the rounding of short curves to such an extent as to cause the whistle to blow, it was time that longer hose be applied. Also, should anything happen to a car and none of the trainmen be in it, the natural impulse of the passenger would be to give a long pull on the cord.

Mr. Farmer brought up the matter of the longitudinal movement of the train pipes and suggested that it would be well to prevent this by the use of some simple and efficient clamp. This longitudinal movement is responsible for a great deal of the leaking that occurs in the trainpipe and the connections. Such a clamp has been introduced on some of the roads of the northwest and the southwest, and is giving the best of satisfaction in both places.

Mr. Desoe showed a model of an indicator that is used by that road at their water stations to show the engineer the point at which he must stop in order that the swinging crane may be in a position to deliver water into the tank. It consisted of an upright long enough to rise to the level of the eyes of the engineer in the cab, and carrying at the top an arm running parallel with the track, and about 6 ft. long. This was so located that if a stop was made anywhere within its length, taking some known part of the engine as a marker, the tank would be in the proper position. As it happens, this is sufficient for all of the engines on the Boston & Albany, but a modification will readily suggest itself to anyone who has to deal with engines of unequal length.

While not strictly within the bounds of the convention proper, we may be allowed to mention an exhibit of a slack adjuster that was made by the Q. & C. Co. of Chicago, in a room adjoining the convention hall. This device was illustrated in the *Railroad Gazette* some time ago. At that time, when the piston of the brake cylinder traveled over the port leading to the adjuster, the air thus allowed to escape pushed the piston of the adjuster ahead and took up the slack. The objection to this was that the work of the adjuster was then done while the full strain of the brake cylinder pressure was upon the rigging, thus offering considerable resistance to the turning of the screw. The modification that has been made consists in allowing the adjuster cylinder to admit air that forces the piston against a strong spring and holds it in this position until the brake is released. Then, as the piston in the brake cylinder moves to the release position, it uncovers the port leading to the adjuster cylinder, and the air contained therein is allowed to escape into the atmosphere, while the spring takes up the slack when there is no strain on any part of the rigging, an improvement that is self-evident in its desirability.

At the conclusion of the topical discussion the annual election of officers was held, which resulted in the re-election of S. B. Hutchins as President; of P. M. Kilroy as Secretary, and Otto Best as Treasurer, and the election of W. F. Brodnax as third Vice-President, and R. H. Cory as the member of the Executive Committee.

The convention adjourned to meet at Nashville, Tenn., on the second Tuesday in April, in 1897.

Experiments with Locomotive Exhaust Pipes and Smokestacks.*

(*Continued from page 197.*)

By observing the effect of the exhaust pipe on a variety of different shapes of smokestacks and exhaust nozzles in moving locomotives it was found as important to reduce the unevenness of the draft as to obtain the highest efficiency of the smokestack. Figs. 13 to 25 represent the smokestacks and exhaust pipes experimented with. The smokestacks shown in Figs. 13 and

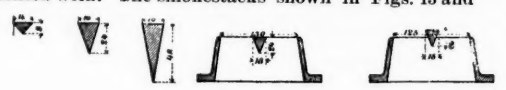
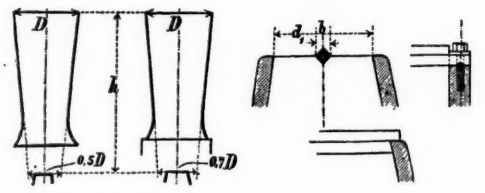


Fig. 26.



Old Shape. *New Shape.*

Fig. 29.

Fig. 30

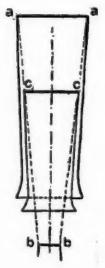


Fig. 31.

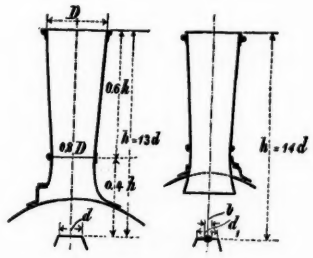


Fig 32.

15, of passenger locomotives, work all right at the highest speeds and small steam supply, but for larger supply they throw out large quantities of ashes and cinders. In smokestacks of similar proportions the uneven effect of the exhaust during heavy work appears to result from the exhaust jets of steam filling the narrowest part of the smokestack too completely. Each of the jets produces for a short time a vacuum considerably above the average, and the force of the air rushing in to fill these sudden and successive vacuums makes an unsteady fire.

Fig. 14, taken from a freight locomotive, has similar effects. But as here almost invariably a large supply of steam is coincident with slow speed, and consequently with slower openings of the steam ports, the steam jets will not ordinarily produce a high vacuum, and will therefore throw out only a small quantity of ashes and cinders. These stacks taper about 1:6.

It was tried, at the beginning of the experiments, to increase the draft by inserting a tube tapering 1:12, but the attempt failed absolutely. The steam production became immediately insufficient and ashes began to fly in quantities. The result was surprising at that time, but it was found that it was caused by the steam jets filling the smaller stack still more and thus increasing the unevenness of the draft. The same result was ob-

* Translated and condensed by Mr. Julius Meyer, from articles in the *Organ für die Fortschritte des Eisenbahnwesens*, by Mr. A. von Borries, Director Prussian State Railroads.

tained in a like experience with the smokestack of a compound express locomotive, Fig. 17.

As a result of these and other observations it can be stated that strongly tapered smokestacks whose least diameter is high above the exhaust nozzle have high efficiency when the locomotive is not strongly worked, but if it is, the effect of the exhaust becomes uneven and causes ashes to fly. The otherwise good steam production therefore decreases as soon as the vacuum made by exhaust steam jets exceeds a certain limit.

In regard to the height of the exhaust nozzle the curves in Figs. 3 and 4, page 197, prove those smokestacks to be very sensitive. The location need only be slightly faulty to produce the bad results. If the nozzle is too high the exhaust jets do not sufficiently fill the smokestack, reducing its efficiency and thereby the production of steam, while if the nozzle is too low, the jets fill the stack too completely, producing the bad effects already mentioned.

The effect of the smokestacks shown in Figs. 18 and 19 is entirely different. They are wider at the bottom, taper less toward the top and have a curved instead of an angular contraction. The rising and simultaneously spreading steam jets gradually fill these stacks, but only do so completely in the upper part after the fire gases have become mixed with the steam. The steam jets, expanding as they rise, lose speed, and, consequently, when they finally fill the stack, make a less sudden vacuum and give a more even draft than in the previous cases.

The level of the exhaust nozzle is not as important, provided the smokestack extends so far down that the strongest steam jets fill it high enough above the inlet and the weakest deep enough below the top.

The smokestack shown in Fig. 18 works so well that the compound passenger locomotive to which it belongs runs on long up grades, 28 to 31 miles per hour with a constant 0.6 cut-off and an average 4-in. vacuum in the smokebox, without diminishing the steam production or making the ashes fly. With this stack there is hardly any unevenness noticeable in the draft, while with the smokestack of Fig. 17 the effect of each exhaust could be distinctly seen in the fire. These good results are obtained by a narrow exhaust pipe 4¾ in. in diameter, and therefore it cannot be assumed as a matter of course that wide exhaust pipes together with stacks of high effectiveness necessarily give the best results. For each type of locomotive there is a certain width of the smokestack and of the exhaust pipe which together will give the most advantageous average result between evenness of draft and back pressure on the piston.

In none of the experiments with narrow exhaust pipes did the locomotives run noticeably harder, and by measuring the pressures at various places it was established to the contrary that for the occurring dimensions the pressure in the exhaust nozzle is only a small fraction of the back pressure in the cylinder; its increase is consequently not of much account.

RESULTS.

Shape of the Exhaust Pipe.—The angle of spread of the steam jet depends largely on the shape of that part of the exhaust pipe below the nozzle. A certain angle of spread of the steam jet is required for the filling up of an appropriate smokestack, otherwise the steam jet passes smoothly through the stack without properly mixing with the gases.

Exhaust pipes of shapes shown in Figs. 13 to 18 and 23 to 25, which are fastened directly on knees with laterial steam admission, or in compound locomotives on rectangular knees, produce the required spreading. Where, however, the exhaust pipe is supported on a long vertical stem, Figs. 20 to 22, the spreading of the jet is so minute that it does not properly fill up wide smokestacks of shapes shown in Figs. 18 to 21. The simplest and most effective remedy for such cases is the triangular bridge which splits the jet and spreads it. Cross and propeller shaped bridges had no better effect than the single bar. By slight variations of the width of the bridge it is easy to obtain, without a change of the level of the nozzle, just that angle of spread which will yield a nearly even and sufficient draft, Fig. 26.

Shape of the Smokestack.—The good effect of the smokestacks in Figs. 13, 14, 15, 16, 21 and 24 proves, in conformity with the results obtained on the apparatus, that only the upper 0.6 of the total height h is of determining influence. Below this point it is, as a rule, sufficient to provide a slenderly curved inlet without angular break. For such comparatively wide smokestacks as those in Figs. 18 and 19 it will, however, be well to make the inlet at a distance greater than 0.6 of h from the top.

Diminsions.—If the sides of the conical part of the older shapes of smokestacks, Figs. 13, 14 and 15, are produced to the level of the nozzle, the diameter of said cone at this point is just 0.5 of the top diameter D. In the new shapes, Figs. 18, 19, 20, 21 and 24, it is almost exactly 0.7 D. This is shown in Fig. 29. This does not result from any intention in the original designs of the smokestack, but was found out only when the results of the experiments were made up. The good effect of the smokestacks of Figs. 22, 23 and 25, with a lower diameter of 0.58 to 0.61 D, makes 0.67 D appear as the advisable width for the lower diameter.

If we call d the diameter of the exhaust nozzle, the approved smokestacks, Figs. 18 and 19, have a height, h, from top of nozzle to top of stack of 13.4 d and 13.7 d respectively; $h = 13\ d$ will give good results. d may be taken as unity, because the ratio between the escaping steam and the quantity of gas to be expelled is almost a constant. From the data at hand $D = 4.2\ d$ may be assumed for locomotives having an exhaust pipe without a bridge, mounted on a short bent knee.

For exhaust pipes on long vertical stems the following dimensions should prevail: $h = 14\ d$; $D = 3.8\ d$; width of bridge, $b = 0.1\ d$; actual diameter of nozzle, $d_1 = 1.07\ d$. The bridge is made of square iron, having a side equal 0.7 of the intended width of the bridge shown in Fig. 30.

As smokestacks of these proportions have a known efficiency, the area of the nozzle may be calculated, the work to be done by the steam jet being known. This is in direct ratio to the resistance against the escape of the fire gases; to S, the total area of the flues, and R, the grate area, then

$$d = 0.156 \sqrt{\frac{S \times R}{S + 0.3\,R}}$$

If the item under the radical be called x, it follows that a change of the grate area $\frac{d\,R}{R}$ effects a change of the exhaust pipe area of $\frac{d\,x}{x}$ and it is $\frac{d\,x}{x} : \frac{d\,R}{R} = \frac{1}{1 + 0.3\,\frac{R}{S}}$ which for $\frac{R}{S} = 7$ amounts to 0.32.

The passenger locomotive having $\frac{R}{S} = 7$ had a vacuum in the firebox, which amounted to 30 to 35 per cent. of that in the smokebox. The influence of the grate area upon the exhaust pipe area corresponded, therefore, to its contribution to the total resistance. The larger the ratio of grate area to flue area, the smaller its influence.

The formula for d should by r'ghts contain not only the speed resistance but also the frictional resistance of the gases in the flues, which may amount to considerable, and in S the length of the flues should find expression. For both, however, the data are as yet lacking.

Abridged Stacks.—The high location of the boiler in new types of locomotives will seldom admit of the figured height of stack, 13 or 14 d. The stack must be abridged and then be made narrower for the steam jet to properly fill it up, as has been shown before. To render the filling up of the short stack similar, geometrically, to that of the long one, the edges C, Fig. 31, of the abridged stack should be on the straight lines $a\ b$ from the top of the long stack to the top of the exhaust. Fig. 24 is an instance of a stack thus abridged, whose good success proves the rule.

The abridgement reduces the effectiveness of the stack, consequently the exhaust pipe must be narrowed to restore the effect of the long stack. In Fig. 24 the stack is abridged 26 per cent. and the exhaust diameter reduced 7 per cent. from the dimensions originally figured out. Within certain limits the exhaust diameter should, therefore, be reduced one-fourth of the ratio of reduction of the height of the stack.

The necessity of the use of abridged stacks is limited to exhaust pipes on short knees, which are employed to keep the flues unobstructed. This construction is now employed only for freight and switch engines, wherein the diameter of the exhaust pipe may, without detriment, be slightly reduced.

In large passenger and express locomotives the exhaust pipes, as a rule, now have long vertical supports whereon they may be mounted low enough to give the figured length of stack. It is to this end even admissible, provided the spark arrester be properly arranged to locate the exhaust nozzle somewhat below the upper row of flues. This has been done in Figs. 20 to 22. If the figured full length cannot thus be obtained, or if for special reasons the nozzle is placed higher, the figured upper full length diameter may still be used in connection with a wider exhaust pipe and a wider bridge.

From data now at hand it would appear that for each inch the nozzle is raised the bridge should be made .04 in. wider. The narrowest section of the abridged stack is located 0.6 below the top of the abridged height.

Testing the Most Advantageous Dimensions of the Exhaust Pipe.—By the use of the above rules dimensions of stacks and exhaust pipes are obtained, which will usually give good results. But there are a number of subordinate matters influencing the effect of the exhaust, which cannot be considered theoretically and, therefore, cannot be brought into the formula for d. Among these are the smokebox and spark arrester, kind of fuel, construction of grate and of ash pan, length of time of greatest exertion, etc.

It will, consequently, be necessary not to be satisfied with the figured dimensions, but to carefully observe the large locomotives in actual operation, and make, if necessary, slight alterations of the steam jet by changes of the exhaust pipe. The smokestack need in no case be changed.

For the improvement of the effect of the exhaust the following rules may be deduced from the above: If too much steam is raised, the diameter of the exhaust pipe is increased; if too little it is decreased. If the fire burns principally in the front of the grate, the exhaust pipe is placed lower or its diameter and width of bridge are increased. If if does not burn well on the front part, the exhaust pipe is raised or its diameter and width of bridge are reduced. The work of raising or lowering the pipe may be saved by simply changing the width of the bridge.

Recapitulation.—The rules are here compiled in the order of their use in designing new stacks: S = flue area, R = grate area, both in sq. meters; the diameter of the exhaust pipe in meters is

$$d = 0.156 \sqrt{\frac{S \times R}{S + 0.3\,R}}$$

Now assume the height h of the stack, making it above the top of exhaust 13d for exhaust pipes on knee bases and 14d for those on long straight stems. For the hight 13d make the top diameter $D = 4.2d$; for 14d make $D = 3.8d$. These exhaust pipes get an actual diameter $d_1 = 1.07d$ and a bridge 0.1d wide.

As shown in Fig. 32, the upper part of the slack is made conical for 0.6 of the total height h, with a bottom diameter of 0.8 D.

Connect this upper part with a slenderly curved inlet. Abridged stacks are given a geometrically similar shape whose top lies in a cone from the top of the figured stack to the top of the exhaust.

The diameter of the exhaust pipe is reduced one-fourth of the percentage of the abridgement of the height. The top diameter of the stack may be left unchanged if a bridge be put in the exhaust pipe, the bridge to be increased .04 in. in width and the diameter of the exhaust pipe to be increased .028 in. for each inch of decreased height of stack. If there is room to make the smoke stack higher than figured, the figured cone is extended upward.

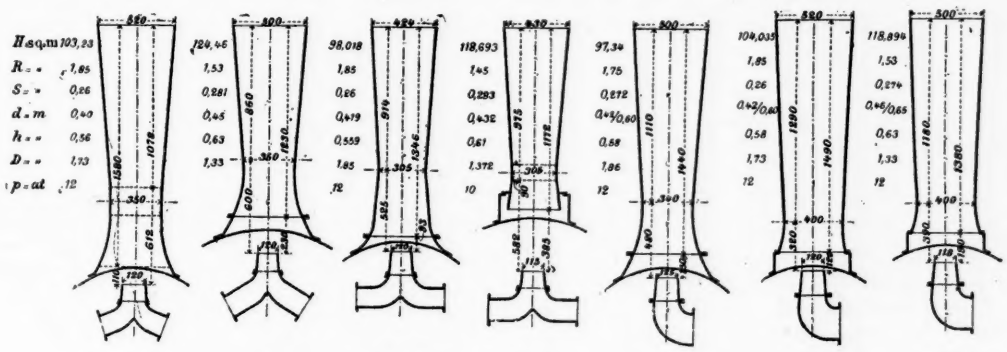


Fig. 13. Fig. 14. Fig. 15. Fig. 16. Fig. 17. Fig. 18. Fig. 19.

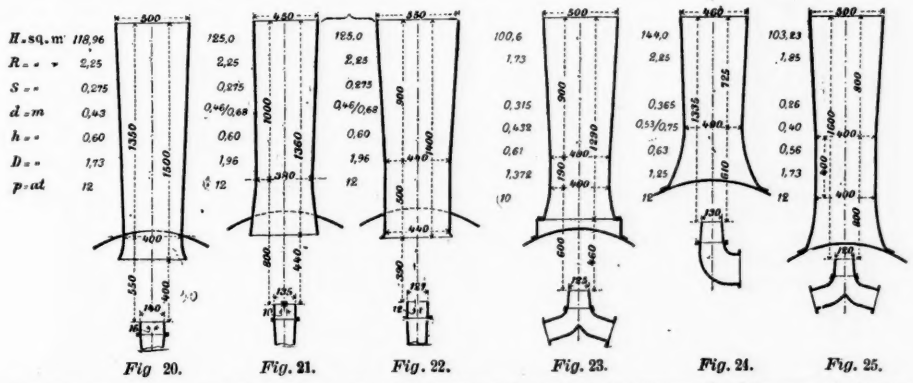


Fig 20. Fig. 21. Fig. 22. Fig. 23. Fig. 24. Fig. 25.

H = Heating Surface; R = Grate Area; S = Cross-Sectional Area of Boiler Tubes; d = Diameter of Cylinder; h = Stroke; D = Diameter of Drivers; p = Steam Pressure in Atmospheres above Atmospheric Pressure.

Experiments with Locomotive Exhaust Pipes and Smokestacks.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The committee of the New York Produce Exchange, which asks the Trunk Line railroads to reduce freight rates on grain from the West, writes to Mr. Blanchard that it cannot get at reliable data as to the average cost of carrying wheat and corn to European ports. This information was desired by the railroads for the purpose of making a comparison, between the different routes, through from the Western cornfields to the European markets. Such a comparison is essential to any intelligent action looking to a change in railroad rates, for without knowledge of the cost east of New York there is no way of accurately estimating the weight that should attach to the demand for a reduction west of New York. It is clear that a part of the disadvantage felt at New York is due to excessive cost at that port; how can it be known but that a demand for excessive profit is also a factor in the matter? The amount of profit that a merchant makes, however, is not a feature that he is going to explain very fully to the public (or to the railroads), and the committee's admission of the existence of this difficulty really ought to simplify the problem of export rates. The merchants cannot tell the ocean rate, and they will not tell the handling rate (*i. e.*, the profit); so the railroads must fall back on the simple criterion of rates and volume of traffic over their own lines. Each road must stick pretty closely to the question, "How much of the traffic is each of my competitors getting? Rates being fixed, by each road, to some definite point (the end of the track; the elevator; to and through the elevator; to the ocean vessel; on board the ocean vessel; or some fixed location, about which there can be no quibbling), the question for the A. & B. road is, Am I willing to reduce my rate a trifle to get some of this export grain away from the X. Y. & Z. road? Can I go to the Board of Managers and convince them that I ought to be permitted to make this reduction?" The arguments necessary to establish such a claim would be based, of course, on a variety of facts which would vary from month to month; the volume of grain moving, the amount of other freight on the several roads, which often would affect the cost of carrying, and even matters wholly irrelevant in the ordinary sense, but which might affect a road's power to get freight. The ability of a road's agents to induce shippers to patronize it is a real factor, though one which obviously is not much discussed in general meetings. The proportion of competitive freight that a road ought to have in the future must be decided largely by what it actually has had in the past, and what could more directly affect that than a half dozen inefficient soliciting agents?

The grain merchants, in their declamations against the Joint Traffic Association, seem to forget what that association was organized for. It was for the purpose, not of getting all the grain for New York, nor to give all of it to other ports; but to make the strife for it civilized instead of barbarous. The New York roads may be allowing a large share to go to Baltimore and Newport News just now, but who knows but what those ports would get still more if there were no association? The roads leading there are as desperate fighters as any that deliver grain at New York, and as the cost of getting the grain from the car into the ocean vessel is admittedly less there than at New York it looks as though in the long run they would compel the New York roads to allow them a differential. It is said that prior to Jan. 1 last, the New York roads were secretly cutting rates in order to get grain; but, assuming that to be so, what can be done about it? If they did make such reductions they probably lost money by the process, or at least sacrificed all profit. Is it likely that they will resume the practice now that they have found a better way to regulate competition with the other lines? They will not long carry grain at cost unless the traffic is a help to their westbound or local freight. There is as yet no evidence to substantiate the claim that the falling off in the grain trade at New York has in any degree slackened the movement of import freight at the port, as compared with other ports. The difference between civilized and barbarous warfare is well illustrated in the present relations between the Trunk Lines and the Norfolk & Western road. That road has taken large quantities of grain to Norfolk, and it seems to have no difficulty in getting vessels to come there and take the grain to Europe, though it has not, like the Chesapeake & Ohio, a steamship line of its own. Under former conditions some one line in the Association would bid under the Norfolk & Western, then another would follow, then all; and all would soon be carrying at cost or less. Now, by a little self-restraint, rates are maintained, and while the consumer may be taxed perhaps ten cents more on a year's supply, the buyer has the decided advantage of knowing, better than ever before, what the rates are, both to himself and to his competitors. It is true that in thus pursuing a moderate course with the Norfolk & Western the New York lines are looking to their own treasuries rather than to those of the grain merchants; and it is also true that they cannot in the long run entirely neglect the latter, except to their own detriment; but who shall say that they have thus far made any mistake in the matter? When a railroad fails to give due consideration to its customers' prosperity it is generally because its manager is shortsighted or obstinate; but the New York railroads are less liable to these infirmities now than ever before, for their best traffic men are engaged every day (in the Board of Managers' meeting) in the calm and deliberate discussion of all these rate questions; and such discussion is the surest antidote to the evils referred to.

The Latest Information about Car Lighting.

The practical questions in car lighting now are whether or not it is worth while to try to use city gas; whether it is worth while in car equipment to put in a lamp that will burn both city gas and compressed oil gas; to put in the extra tanks necessary to carry an adequate supply of compressed city gas, and to put in the plant necessary to compress the gas. The alternative is to accept the Pintsch system; to equip your cars to burn Pintsch gas with the best efficiency and greatest economy, and to encourage the building by the company of gas works and compressing plant to supply you at points where it is necessary to gas your cars. These we say are the really practical questions in car lighting, for in the present state of the art, if one proposes to improve upon the kerosene lamp, gas is the only method of lighting of which the economy and reliability have been developed and demonstrated by large experience. The answer is mostly a matter of relative cost.

There are other arguments on both sides, but on the whole the important question of policy in this matter is simply that of relative cost, and here we are gradually getting a body of useful knowledge. Last June we published the result of some investigations as to the efficiency of different lamps and different gases made for us by Dr. Love, of New York. It is not necessary to cite many of the figures got by Dr. Love, which can be found in detail in our issue of June 7. The figures of present significance are those comparing compressed city gas, burnt in the Gordon-Mitchell lamp, and Pintsch gas, burnt in the Pintsch-argand. Dr. Love found that compressed city gas, as compared with the average of three samples of compressed Pintsch gas, had an efficiency of 1 to 3.4, using one pattern of Pintsch lamp and 1 to 3.75 using another pattern. That is, calling the candle power developed per unit with the compressed city gas 1, the candle power developed by the same unit of the Pintsch gas was 3.4 or 3.75.

Last December (issue of Dec. 27) we published a report made by Prof. J. B. Denton, of Stevens Institute, and Prof. W. H. Chandler, of Lehigh University, giving the results of an investigation of relative efficiency made for the Lehigh Valley Railroad. Those gentlemen got under one set of conditions a ratio of 1 to 3.78. Under another set of conditions they got 1 to 3.44, and under still another 1 to 4.4. It will be observed that under the conditions least favorable to the Pintsch gas and lamp they got almost exactly the same relative efficiency as was found by Dr. Love.

We have now before us a copy of still another report made by Professors Chandler and Denton to the officers of the Lehigh Valley Railroad, this last being the result of a study of the comparative cost of city gas and Pintsch gas. They took the gas furnished to them by the railroad company; they say "the gas used in these experiments was taken at random from the regular sources of supply to your cars at Jersey City and Phillipsburgh under the direction of your management without our assistance." They make a very elaborate study of the cost of producing, compressing and delivering the city gas. They say "the lowest probable cost for city gas per thousand cubic feet, on board cars, is (for 20 per cent. leakage) $2.883." Taking the efficiency of the city gas as unity and that of the Pintsch gas as 3.93 (the average of certain comparable tests), the cost of city gas for the amount of illumination equivalent to that got from 1,000 cu. ft. of Pintsch gas would be $11.33. In other words "the Pintsch gas might be sold for $11 33 and be as cheap per unit of illumination as the city gas at its cost of $2.883 per 1,000 cu. ft. stored on the cars." But they say that "we understand that the Pintsch Company proposes to furnish a generating and compressing plant at Phillipsburgh and operate it, covering all labor and expense necessary to charge the cars, at the rate of $5.09 per 1,000 cu. ft. stored on the cars."

Their figure of $2.883 is made up as follows: Cost of city gas equivalent to Jersey City gas, delivered to compressing station at $1.50 per thousand, and including extra cost due to unavoidable loss by leakage between compressor and cars of 20 per cent. of total gas, $1.88; cost of compressing and charging, including labor, repairs, interest and depreciation of plant, $1.003.

They add that in view of the large difference in candle power of the two lamps equal illumination could not be obtained in a car unless there were nine Gordon-Mitchell lamps to about five Pintsch lamps. Under this arrangement the relative cost of the equal illumination would not be greatly altered on the above figures, but "such a difference in the number of lamps is, of course, impracticable, so that the use of Pintsch-argand lamps with Pintsch gas must be accompanied with greater illumination in the car than is obtained from an equal number of Gordon-Mitchell lamps at the service rates of consumption for each, which were used in the experiments."

In spite of the fact that greater illumination would be got with the Pintsch lamp and gas, in the proportion of about 54 to 29, the estimated annual saving for the Lehigh passenger equipment is $3,715.

But the comparison is carried still further, and it is well to consider what the investigators from whom we are quoting have learned about the Pintsch four-flame lamp which certainly has had the test of ample experience. Putting the candle-power of the Gordon-Mitchell lamp at 29 and that of the four-flame lamp at 35.4 the annual saving by the use of the latter, with Pintsch gas, is estimated at $4,130.

The report from which we are now quoting is very detailed, covering, with its tables, 44 typewritten pages, and we shall not now attempt any further examination of it or make any further quotations from it, although we expect to give some of its figures in a good deal of detail hereafter. We write now merely to call attention to this, the most recent study of the subject that has been put into the form of a report; and we advise anybody who is interested in finding out the truth of the matter to get a full copy of the report. We understand that still further investigations in the same direction are going on for the Pennsylvania Railroad. These latter are being made by Prof. C. F. Chandler, of Columbia College, and Prof. Denton and we shall be much interested to see how their investigation bears out the conclusions reached by the other experts.

Apparently, the relative illuminating efficiency of the gases is pretty well settled. The figures which we give above were taken under such different conditions that their coincidence has great value. The question may still be raised whether or not Prof. Denton and Prof. W. H. Chandler have got their cost figures for city gas too high. Concerning this it is not necessary for us to express an opinion now; but they have not spared effort to get the facts, and they have not been afraid to give their method of investigation in great detail. If they are wrong their critics will not need to set up men of straw to attack.

Concerning Specifications.

About a year and a half ago we raised the question how far it is advisable to specify the make of the different articles which go to compose a freight car. The particular case then considered was that of a road under special necessity to use strict economy, and the specifications sent out by it for bids named at least 16 individual articles of importance in the composition of a car. These covered the roof, the doors, the couplers, parts of the draft gear, the trucks, the brake, the brake beams, the springs, the journal bearings, and the painting, besides other items The question raised was simply as to the policy of such close specifications. Is that the way to get the most service for a dollar spent?

A great deal was said to us, in correspondence and in talk, on both sides of the question. The arguments may be summed up in the words of two well-known and influential superintendents of motive power who wrote to us on the subject. One of them says: "It would be a very good plan to specify the make of every item going into a car and I hardly see why we should not do it. In our own practice at the shops, we use [this list includes names of makers of paint, oil, japan, springs, axles, wheels, couplers, brake beams, center plates, box lids and roofs]. I do not see any reason why we should not specify these as we use them in our own work in the shop—why we should not do the same thing if we ordered the cars from an outside party. If specifications and inspection could be so close as to guarantee results independent of make then the widest latitude might be allowed. But in my own practice I am not able to point to any specifications which completely cover the ground, and it is next to an impossibility to secure inspectors of sufficient experience to see that specifications are thoroughly complied with." The other superintendent of motive power writes: "The chances are that such specifications are drawn up with boodle and favoritism behind them. The question of preparing specifications for equipment and material which should enable the officers of the road to use their judgment as to what was the best material was long ago considered by us. You will observe that in our specifications there is no mention of any maker's name. This applies even to the air-brake. Thus we do not put the car builder or the engine builder entirely into the hands of any manufacturer. There are certain articles that we are licensed to use; and I believe all builders who bid on equipment for us know that we are not tied up to any particular make of material, and if unreasonable prices are asked we are always ready to take a fair equivalent of some other make. We prepare our specifications with blanks to describe more in detail the requirements in the way of grain doors, roofs, beams, etc."

This latter practice is illustrated in a large order now out for bids, that of the Baltimore & Ohio for 5,000 cars and 75 locomotives, say $3,000,000 in all. Some notes from these specifications appear on another page. Not a single article is specified by name, not even the air brake where, if anywhere, we might assume that there is no room for competition. The idea controlling in the preparation of these specifications has been "to make a Baltimore & Ohio dollar go as far as it can," having due regard to price, quality, time of delivery and reciprocity in business.

After a good deal of thought on the subject and after hearing the arguments of many men, we are more than ever of the opinion that the method of open specifications is best. No doubt there are a few articles in which the product of some one maker is better than that of all the other makers. But this can be true of only very few, and of them it is not likely to be true for many years at a time, and he must be an acute and experienced and lucky man who has found out exactly the best one of each of the many parts that go into a car.

There is not the least doubt that most of those officers who specify certain makes of roofs, grain doors, springs, axles, couplers, brake beams, etc., think that they have discovered and named those which are actually best, but that they have not done so is proved by the very fact that they do not agree among themselves as to the best makes. Obviously, there cannot be two best couplers or two best springs; there might be the best two or the best three, but then the apparent policy would be to specify these two or three and let the bidders fight it out.

Again, it does not seem beyond human ingenuity to make specifications so definite and so exacting that the parts specified will be practically the equivalents of those made by the best makers. There are railroad companies that say definitely, of springs for example, "made by—or the equivalent." There are others that say of springs, that the inspector must weigh at least 10 per cent. of each kind of coils in the springs; if he finds any showing less than minimum weight he will weigh every coil in the lot; he must test all springs in a testing machine either singly or in lots; makers must furnish for chemical test one extra spring to represent each pile mentioned, and these springs must conform to a certain formula as to carbon, manganese, phosphorus, silicon and sulphur, and so on for several pages. Either way—by precise specification of quality and by careful testing, or by naming some first-class and reliable maker—a standard is furnished to the bidder to work up to, and it is fair to suppose that he will find it safest and cheapest to buy special parts of makers of high reputation.

So after all there does not seem to be any real necessity for naming the make of many, perhaps not of any, of the articles which go to make up a car; but the objections to doing so are great and obvious. We want to believe and we do believe that our friend who says "the chances are that such specifications are drawn up with boodle and favoritism behind them" is wrong. We do not believe that any large percentage of superior railroad officers are corrupt. We do not believe that specifications are ordinarily restricted for corrupt reasons; but it is a most excellent plan for a railroad officer, as well as for other human beings, to keep out of temptation. But, setting aside entirely this reason, there remains the other one, the importance of opening bids to competition as far as that can be done without danger of getting inferior product; and so long as the railroad company reserves the right to reject bids and is served by competent mechanical officers this danger does not seem to be serious.

One reason often given for specifying articles by name is that the railroad company is able to make advantageous contracts by agreeing to buy all of its material of some one kind from one maker, for a year, or for some specified time. This is a special case which need confuse no one, as to morals or as to policy. A familiar way of treating such cases is for the railroad company to furnish such special articles and the contractor has nothing to do with their price.

This whole subject would furnish a topic for an interesting paper and an enlivening discussion in one of the railroad clubs.

The establishment of a package express service on the lines of the Brooklyn Heights street railroad, briefly announced in the *Railroad Gazette* last week, is to be carried out at once, and it is expected that the express cars will be running within six weeks. This company operates about 100 miles of lines in Brooklyn, and this change from wagons and horse power to cars and electric power will be an important innovation. The average length of the lines radiating from the business center, not far from the East River bridge, is perhaps five miles, and the saving in time should be an appreciable benefit on thousands of shipments of light goods, and on shipments, either light or heavy, of perishable food products. Concerning the money value of this saving, and the ultimate financial results, it is not so easy to predict. The city of Brooklyn is a large territory and the population is about a million, but although there are hundreds of manufactories in some districts, especially in the northern part of the city, the greatest real demand for improved service must be from receivers or shippers of light goods, and a large quantity of such traffic is necessary to make the business profitable. The ultimate distribution of goods to Brooklyn consignees must be by wagons in any event, so that the branch express offices must be continued, and perhaps even enlarged in size and number, and the wagon service kept up. Manufacturers or others maintaining wagons for carrying heavy goods to and from the wharves (which really constitute the main railroad freight station of this island city) will be inclined to move their light packages by the same means, unless the express service is decidedly quicker and equally cheap; and those having arrangements with other express companies to call for goods will have inducements to continue those arrangements. In fact, the express company (the National), operating on the electric cars, will, we assume, have to meet the active competition of the other express companies, such as the American and Adams, at all points, though there would seem to be no good reason why there should not be an equitable arrangement between the big companies for exchange of business at the bridge or ferry terminal, where the traffic between Brooklyn and most of the rest of the world is concentrated, and thus avoid much expensive duplicate service. The quickening of mail collections and deliveries, by putting the bags on the electric cars, has been a marked and acceptable improvement; and if the people appreciate with equal intelligence an increase of speed in the parcels traffic this movement should be as popular. We understand that the railroad company has the encouragement of the Manufacturers' Association of Kings and Queens counties, a committee of that association having investigated the subject last January. Side tracks are to be built at all the way-station express offices, so that a car stopping to deliver and receive packages need not hinder passenger cars.

The utter impossibility of getting the public to even try to form clear ideas of the relations of rate-making, rate-cutting, pooling, the interstate commerce law and kindred things connected with traffic matters, is a discouraging fact that shows little if any indication of improvement. An intelligent reporter, or editor, in a New York daily paper, gives his readers the following:

In future, the Union Pacific officials will keep clear of brokers and secret cut rates, the legal department having ruled, since the Supreme Court's decision in the Brown case, that a road in the hands of a court must confine itself to meeting the secret cut rates of competitors, when discovered, with open tariffs, wherever made.

This item seems to be a condensation of a longer paragraph received by telegraph or found in some Western paper. It is entirely unlikely that the New York man intended to accuse the Union Pacific law department of having countenanced lawbreaking for the past 10 years; but the item definitely conveys the idea that secret rates are now to be abandoned *because* of the Brown decision. But the Brown decision makes no change whatever in the law concerning rates or their publicity; it only helps to detect lawbreakers. The implication of the item, as plain as day, is that the Union Pacific lawyer has told the Union Pacific traffic manager that henceforth he must cease illegal rate-cutting because, contrary to past experience, he is now likely to get found out. It goes without saying that when such an order as that is given, by a railroad official subject to a Receiver, it will not be allowed to become public. Here is another example of the way "news" is made:

"CHICAGO, April 18.—The Interstate Commerce Commission is to drop all proceedings against the roads for breaches of the law committed prior to the Supreme Court's decision in the Brown case, and under the supposition that the Constitution protected the roads and the officials from furnishing evidence to convict themselves. Bygones are to be bygones. Old scores are to be wiped out, and both the commission and the roads are to start out on a new career of combined usefulness in the enforcement and observance of the law." And so on, till the allotted space is filled up.

This, again, seems to be a condensation of a much longer statement, or interview, the whole of which is undoubtedly founded on—gas; and gas without even a string around it.

Ohio used to be called the "collision state." This term was used in the headlines of newspapers in Pittsburgh and other cities in adjoining states where jealousy seemed appropriate, either in a business sense or as a species of journalistic humor, and we do not pretend to say that the implied opprobrium was deserved; certainly there were worse collisions in other states. But that collisions have at some period been common enough to make the citizen of Ohio feel lonesome without them, is strongly indicated by the announcement, recently issued, that an exhibition collision will be put upon the boards—or rather on the track—at Buckeye Park, 25 miles south of Columbus, on the Columbus, Hocking Valley & Toledo, May 30, next. This is not a fake, like the announcement of last year, though the same man, A. L. Streeter, is the master of ceremonies. He has secured the co-operation of the railroad company and two old C., H. V. & T. engines will be used, Nos. 12 and 21. They are being painted up like circus wagons so as to give suitable éclat to the occasion. The advertisements say that each engine is to be followed by a train of cars; but we have no information as to the number of cars, the speed or what the engine crews intend to do. It appears that the trouble last year at Canton was not a lack of customers, but rather a superfluity of them; they pressed against the fence and broke it down and the gate money was in jeopardy, hence the abandonment of the show. This year Mr. Streeter is more discreet. There is to be no charge whatever and you cannot cheat him if you try. Buckeye Park wants an opening, an opening must have an "attraction," and here you have it; a bang-up feature, as it were. Evidently this collision specialist has induced the railroad to bear all the expense, in expectation of the excursion fares that can be raked in on Decoration Day, and, in addition, to pay him a commission, just as it would to any other picnic manager. He expects 15,000 or 20,000 people. We regret that we cannot reproduce the artistic illustrations that adorn the placard issued by the railroad company for this "event."

The legislature of Ohio has passed a law requiring the railroads to carry bicycles as baggage, similar to that recently passed in New York; and the wheelmen of that state are now spending their nights and days rejoicing over their "great victory." The joyous state of mind of the New Yorkers and Ohioans only serves to aggravate the misery of wheelmen in other states, and we learn from a Chicago press dispatch that in that unfortunate city they are "indignantly angry." This is not so very surprising. The degree of anger must naturally depend upon the depth of evil manifested by the railroads in their oppression of their wretched customers; and, as everyone knows, Chicago is the center of the most intense railroad wickedness known on the face of the globe. The traffic associations of that city, strong in their sense of unlimited power, have adopted the fiendish device of requiring a passenger presenting a wheel not only to pay a small fee for having it carried, but also to sign a contract releasing the railroad company from liability for damage from breakage. That this produces anger, modified by indignation, is not to be wondered at; the wonder is that it leads to nothing worse than that. The New York railroads have issued orders directing their baggagemen to comply with the law, although it was rumored at first that one or two prominent roads would ignore the law and let the Attorney-General carry the question of its constitutionality to the courts.

The Erie issues a circular stating that bicycles will not be carried on the two fastest trains, Nos. 5 and 8, without a special order from the general baggage agent. The Southern Passenger Association last week voted to make a uniform charge of 25 cents on bicycles, without regard to distance. It is said that the wheelmen presented arguments objecting to the charge, but that the railroads, in their reply giving the reasons why the charge was made, told them that the general introduction of bicycles had diminished short distance travel on the railroads.

The number of passengers killed in train accidents in Great Britain and Ireland in 1895 was five, as compared with 16 in the year previous. The Board of Trade return for the year has just been issued and contains the usual statistics, the totals of which, including those just noted, are:

	Killed.	Injured.
Passengers, in train accidents	5	399
Passengers, other causes	78	710
Employees, train accidents	12	88
Employees, other causes	430	2,566
At grade crossings	65	33
Trespassers, including 96 suicides	381	144
Other persons	53	81
Total, 1895	1,024	4,021
Total, 1891	1,115	4,120

In addition to the above, the railroads report 66 persons killed and 5,297 injured at freight and passenger stations and on railroad premises elsewhere, with which the movement of trains had nothing to do, thus bringing the total number of personal accidents on railroads during the year up to 1,090 persons killed and 9,318 injured. The blue book contains the reports of investigations made by the inspecting officers during the last half of the year, there being no less than 39 accidents reported on. Among these is the derailment at St. Neots on the Great Northern, Nov. 10, in which a night passenger train, running 60 miles an hour, was wrecked by a broken rail. The report contains diagrams showing sections of the rail and detail statements of the results of the chemical analyses and tests of tensile strength made on the pieces of the broken rail.

Colonel Ludlow, Corps of Engineers, U. S. A., who was Chairman of the Board of Engineers, who reported on the Nicaragua Canal, was before the House Committee on Commerce this week. Judging from the short reports of the conversation which appear in the daily papers, he must have given the committee a lively hour. We regret extremely that we could not have been present. Colonel Ludlow stated a good many facts in unmistakable terms, and he expressed in very plain language what a great many people have thought about the discourteous, disingenious and unprofessional manner in which Mr. Minocal has answered the criticisms of the Board. As to Mr. Miller's methods we need say nothing. They cannot be called unprofessional, for promoting has become his profession.

NEW PUBLICATIONS.

A Treatise on the Law of Negligence. By Horace Smith, B. A. Elaborated with notes and references to American cases by W. H. Whittaker, of the Cincinnati Bar. Second American, from second English, edition. Re-edited and enlarged, with the citation of all the American cases brought down to date, by James Avery Webb. Octavo. Pp xxvii., 604; Table of Citations, 605-661; Index, 663-734. St. Louis, The F. H. Thomas Law Book Co. 1896.

A second American edition of this useful text book is justified by the rapid development of its subject during the decade since the publication of the previous edition. The law of negligence is of especial importance to railroad managers and counsel. That its principles are becoming fairly well settled is evident from a comparison of this with former editions of the same book.

Among the topics treated are the vexatious questions of lateral and adjacent support, interesting to land-owners in this day of tall buildings; the relations of master and servant; and the liabilities of innkeepers, carriers, public officers, trustees, directors of corporations, bankers, brokers, etc. The rights and liabilities of sleeping car and railroad companies are extensively discussed, as are the doctrines of contributory and imputed negligence. Under many of these heads the authorities cited are conveniently arranged by states.

There is still considerable divergence between the English and the American courts, and between the rules followed in different states, on some points. The text retains the confusing division into degrees of neglect of duties requiring (1) ordinary care, (2) extraordinary care, and (3) less than ordinary care. The voluminous notes of American cases show that the rule, that such degree of care is required as an ordinarily prudent man would reasonably exercise under similar circumstances, now generally prevails in this country.

It appears that the doctrine of comparative negligence is nearly exploded in the United States, though it is still folllowed to a certain extent in a few states and in the Federal courts.

The book is well printed and the ample type used in the American notes is a relief to the eye. We notice a few misprints, such as "grantors" for "guarantors," and that the author follows Thackeray's usage of "avocation" for "vocation"; we also find him writing "fix" in the sense of "repair," which his countrymen are wont to call peculiarly an Americanism.

In the abridgment of statutes regulating the action for injuries causing death, the removal by the New York constitution of 1894 of the limitation upon the amount recoverable is not noted.

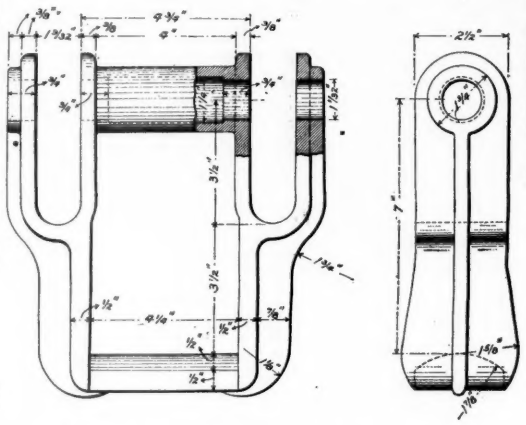
The editors have done their work acceptably. The index is good; the citations seem to be full, and the table of cases includes references to text books, a new feature. The treatise is more than a useful digest for working lawyers, and the publisher is to be commended for not padding it into two volumes.

Water and Gas Appliances. By R. D. Wood & Co., Constructors of Gas and Water Works, 400 Chestnut street, Philadelphia.

Messrs. R. D. Wood & Co. have issued a revised and enlarged edition of the pamphlets heretofore published by them descriptive of water and gas works. The present edition is a cloth-bound volume of 112 pages, 8½ in. × 10½ in. It has a good alphabetical index, besides a table of contents and a list of 48 tables. The first chapter is on water supply and describes very briefly various systems, some of the objects to be secured and the various methods of securing them. This covers size and amount of pipe, depth of laying, connections, pumping engine duty, etc. The chapter on cast-iron pipe describes methods of manufacture and special patterns and connections. This chapter also includes information about the carrying capacity of pipe, with tables of discharge capacity, of frictional heads, etc. Various specialties, as flexible joints, cutting-in specialties, flange specialties, etc., are illustrated and described. There is a chapter on fire hydrants, one on valves, one on the Geyelin-Jonval turbine, and the book concludes with a chapter of 36 pages on gas works and gas work appliances.

Linstrom's Locomotive Truck Spring Hanger.

This spring hanger, the invention of Mr. C. Linstrom, Master Mechanic of the Yazoo & Mississippi Valley Railroad, is made of malleable iron and its tensile strength exceeds 50 tons. It is claimed for it that it provides a freely oscillating and true bearing seat for the locomotive truck springs, and will not twist the springs, as is often the case with the ordinary device, so that the weight of the engine is not distributed equally on all spring-bearing surfaces. This twisting of the springs



Linstrom's Locomotive Truck Spring Hanger.

often repeated causes breaking notwithstanding the fact that the limit of elasticity has not been exceeded. It is further claimed that this hanger will make the weight of the engine bear on the outside as well as on the inside of the truck equalizers assuring the latter a vertical position by means of the additional outside jaws.

New York Railroad Commissioners' Report.

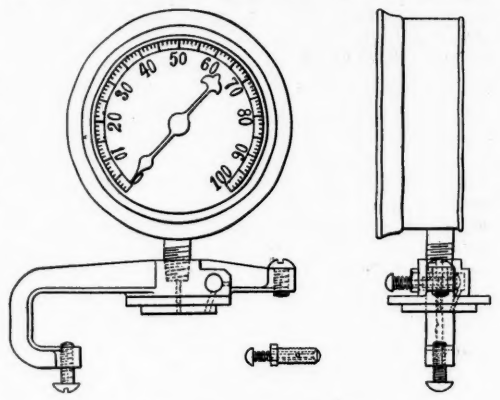
The 13th annual report of the New York State Railroad Commissioners was reviewed in the *Railroad Gazette* of Jan. 17. It has now been issued in complete form, volume 1 containing the report proper, with records of investigations and reprints of all the laws of the state affecting railroads, and volume 2 the full reports of the railroad companies. To the latter are prefixed about 50 pages of tables containing summaries of the information contained in the companies' reports. Volume 1 contains a number of full-page direct-process pictures, among the subjects being the Lyon Brook viaducts, old and new, the new passenger station at Syracuse, and the Erie coal-car unloader at Cleveland, O. There are also copies of drawings of the elevated structures recently built by the New York Central in Park avenue, New York City.

Railroad Legislation in New Jersey.

Notes of some of the laws passed by the last New Jersey Legislature were printed in the *Railroad Gazette* of April 10. Since then the Governor has signed two others, one authorizing municipalities to grant rights to lay railroad tracks in streets, and one forbidding street railroads to carry freight or express matter. The first covers only cases of companies which have already built some track or have a line laid out in streets, and confirms contracts heretofore made. In future no such track shall be laid until the company has acquired the rights of the abutting owners. The law prohibiting freight and express business does not apply to roads which had been lawfully engaged in such business previous to the time the act took effect.

A Few Air-Brake Novelties.

During the discussion of topical questions at the Air-Brake Men's Convention, Mr. C. C. Farmer, of the Missouri, Kansas & Texas, showed models of an attachment for connecting a pressure gage with the hose coupling of the train and signal pipes. Its construction is shown in the accompanying engraving. It consists of a light

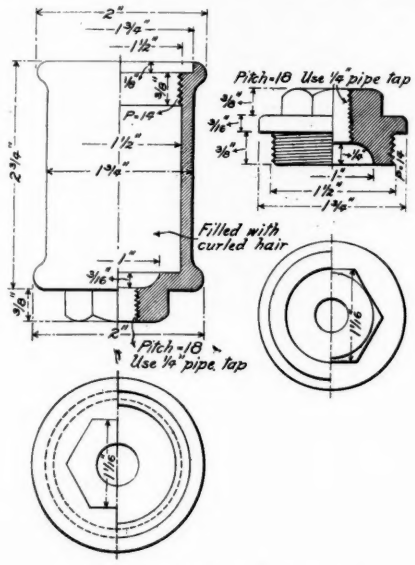


Farmer's Gage Attachment.

brass casting finished to form a seat with the hose coupling and with adjusting screws in the stem and shank for adapting it for use on either the train line or signal coupling, the gage screwing into the back of the device as shown.

Another very handy little tool was shown by Mr. Sanders of the Missouri Pacific. It is used for boring out triple valves by hand. The stem of the tool slips down through the triple and is held central by the conical seat at the top and the nut at the bottom. The tool is set in the shell as shown and is adjusted to its work by the screw *A*, which is above and behind it. The shell turns freely over the stem and is turned by the handle. The feed is made from below. There is a star or a small handle shipped over the square at the bottom of the screw *B*. The upper end of this serew terminates in a shoulder at *C* and a large flat-headed screw *D* which have bearings against the shell, thus serving to raise and lower it according to the direction in which the screw *B* is turned. This tool is intended for boring only and not for facing off at the bottom.

Mr. Sanders also showed an air filter for pump governors which is very simple and is shown herewith. It



Air Filter for Pump Governor.

consists of a shell resembling an oil cup, tapped at the top and bottom for the air pipes, and having two disks of perforated sheet brass between which there is a filling of curled hair.

The East River Bridge, New York.

Some six weeks ago Justice Gaynor granted a temporary injunction restraining the Commissioners of the new East River Bridge and the Mayors and Comptrollers of New York and Brooklyn from purchasing what is known as the Uhlmann franchise, a bargain for buying which for $200,000 had been made. This injunction was vacated April 28 by the Justices constituting the Appellate Court of the State of New York, sitting in Brooklyn. All five of the Appellate Justices concur in the opinion, which was written by Chief Justice Brown.

The plaintiff sought to have the contract annulled on the ground that (1) it is illegal; (2) that it was entered into fraudulently with intent to defraud the cities, and (3) that it is a waste of the public funds in that an exclusive right was granted to the Brooklyn Elevated Railroad to use the bridge.

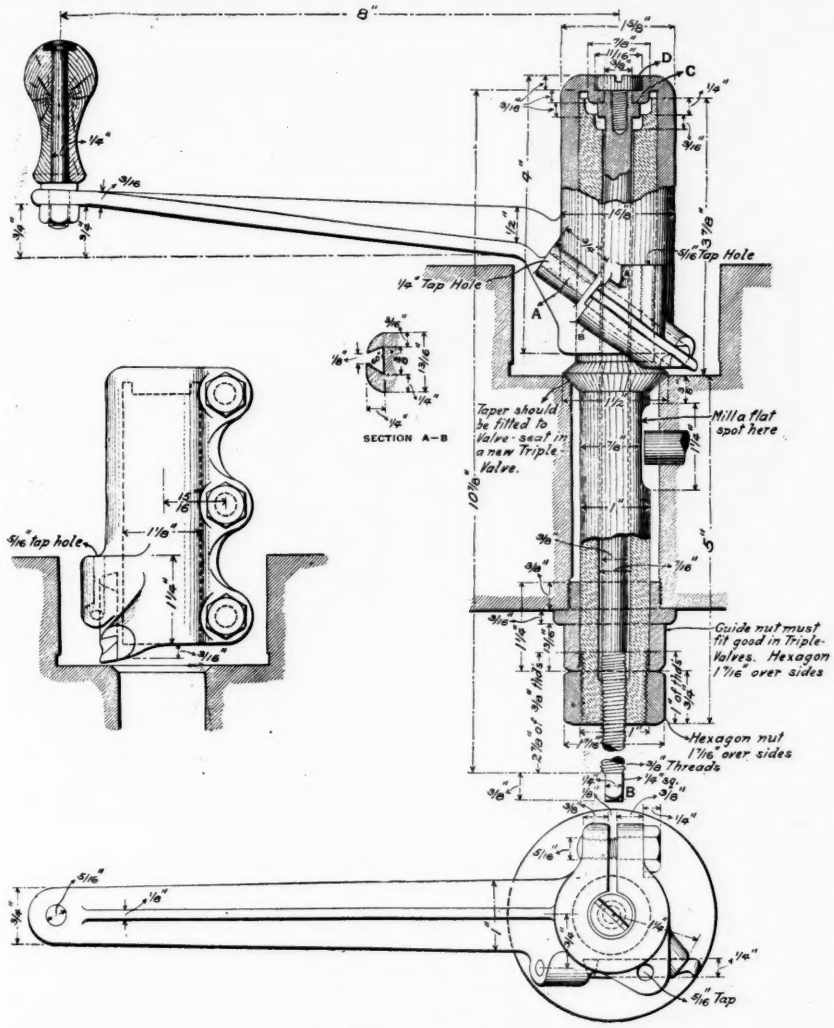
The Appellate Justices say that (1) the legality of the purchase of the charter is not open to question, nor is there any question as to the legality of the clause in the contract in reference to the construction of two separate

and independent railroad tracks for the use exclusively of elevated railroads. The learned Judge (Gaynor) who heard the case at Special Term treated this clause as granting the use of tracks exclusively to elevated railroads controlled by the bridge company. In fact the clause does not purport to grant the use of tracks to any corporation; it relates simply to the plan and construction of the bridge and has no relation to the operation or use of railroad tracks after the bridge is completed. There is nothing illegal in contracting to construct the bridge in such a manner as will permit the use thereof by an elevated railroad company, and, moreover, the Commissioners have the broadest power possible as to the plan of the bridge. The act puts no limitation upon their power in this respect beyond what shall seem to them best for the public interest.

(2.) The charges of fraud are dismissed from the case with very few words, but they are severe and ought to be written above the mantelpiece in Judge Gaynor's library in order that he could read them over night and day. The Justices say "The allegations of fraud are not sustained by a scintilla of proof. . . . The injustice and impropriety of inserting in a legal pleading unfounded and unsupported charges of this character against public officials is so gross that the plaintiff's course in this respect is properly the subject of severe criticism." We will permit ourselves to add that the conduct of the Judge who first allowed this accusation to pass unsustained by a scintilla of evidence and yet unrebuked, has a singular notion of the duties of a Judge.

(3). With reference to the question of a waste of public funds, the Justices say that it is apparent that the clause of the contract referring to the building of the railroad tracks and terminals is not a waste of property. Those things are parts of the plan of the bridge. So far from raising any implication that this clause grants an excessive privilege to any corporation the affidavits in the case prove directly to the contrary. It is assumed in the complaint that the franchise purchased is worthless in that the charter had been forfeited. The Justices say this assumption has no support in the act incorporating the bridge company, and "the decision of the learned Judge who heard the case at Special Term proceeded in this branch of the case upon a misconception of the facts." It seems as if the learned Judge had had a fundamental misconception; namely, that it is his duty to please an ignorant public rather than to determine and uphold the law.

Finally, the Appellate Justices say that "both the location of the bridge and the sum to be paid to the bridge company are matters resting solely within the sound judgment and determination of the Commissioners, and their opinion is not subject to the review of the courts unless there has been waste of the public funds. There is nothing in the case before us that would, on that ground, justify us in interfering with their action."



Boring Device For Triple Valves.

Missouri Pacific Railway—St. Louis Shops.

The Production of Iron, Gold and Silver in 1895.

Last week we published a table showing in a very compact form certain statistics of the mineral production of the United States, compiled for Volume IV. of "The Mineral Industry." Below are some comments on the production of iron, gold and silver as prepared for the *Engineering and Mining Journal:*

Iron.—The production of iron in 1895, as compared with the previous year, presents the most remarkable change ever shown in two consecutive years in this country. Not only was there a sharp reaction from the depression of the previous year, but the output reached the highest level yet attained. There was made in the United States last year 9,600,603 metric tons (9,446,308 long tons) of pig iron, an increase of 42 per cent. over 1894, when the total was 6,764,572 metric tons (6,657,388 long tons). The highest production on record previously was 9,353,020 metric tons (9,202,702 long tons), in 1890. This advance once more puts the United States in the position of the leading iron-producing nation of the world. A comparison of the four principal countries shows that while we made 9,600,603 metric tons of pig iron, Great Britain turned out 7,620,000 tons; Germany, 5,788,798 tons, and France, 2,005,889 tons. That is, to put it in another form, if we take our own output at 100, that of Great Britain was 79, Germany 60 and France 21.

An increasingly large proportion of this iron is each year converted into steel, and our steel production in 1895 was nearly 6,004,000 metric tons, of which approximately five-sixths were Bessemer and one-sixth open-hearth steel. The total was 20 per cent. greater than the largest heretofore reported in any one year.

In making this pig iron there were used a total of 17,753,710 metric tons (17,474,123 long tons) of iron ore, of which 17,221,200 metric tons (16,950,000 long tons), were produced from our own mines, and 532,510 metric tons (524,123 long tons) were imported. Thus about 3 per cent. of the pig iron was made from imported ores, though native coal and flux were used in its manufacture.

Gold.—There was a notable gain in the amount of gold obtained from our mines, which in 1895 reached a total of 70,470 kilograms (2,265,612 oz.) fine metal, value $46,830,200, showing a gain over 1894 of 7,671 kilograms (246,381 oz.). This result shows that the impetus given to gold mining all over the world by the events of the past two years has not reached its maximum. Since there has been no general resumption of hydraulic mining in California the increased production of gold has been due to an extension of the working of old mines: to the opening of new mines, and to a continued improvement in methods of working and reduction of ore which now permits the profitable exploitation of mineral properties too low in grade of their ores to pay under former wastful or imperfect systems. While the increase in the production of the yellow metal has been very generally distributed, the most notable gain has been made in Colorado, where it was due not only to the active working of the Cripple Creek mines, but to the steady gain reported from the older gold districts of the state. The other Western states have also shown considerable gains; Montana and Idaho both recording large advances, while California also showed a large increase, and the development of the gold-fields of Utah proceeded quietly but on an important scale. In Arizona, owing to local circumstances, there was a decrease in the gold output. In the Southern States there has been little change.

Silver.—The silver production again showed a decrease; in 1895 it amounted to 1,441,087 kilograms (46,331,235 ounces) of fine metal, of the commercial value of $30,244,296, a decrease of 109,300 kilograms (3,515,640 oz.) from 1894; while the total was about 76 per cent. of the production of 1893. The quantity of silver actually refined and put upon the market by the various smelters and refiners in the United States was considerably greater than this, but we have carefully deducted all the metal produced by them from foreign ores and bullion, and the quantity given is only that of the metal obtained from domestic ores. The reduction in output, combined with other circumstances, has had the effect of raising the price of silver slightly, the average price or commercial value for the year being 65.3 cents per ounce, or about 2 3 cents per ounce greater than in 1894. We may note here the fact that in spite of the continued low price and the general decrease in output some of our larger mines have continued steadily at work with fairly profitable results Such mines as the Ontario and the Daly in Utah have shown no disposition to abandon production, and the silver-lead mines of Idaho have diminished their output rather on account of other circumstances than because of the price of the white metal.

TECHNICAL.

Manufacturing and Business.

After May 1 the New York office of The National Switch & Signal Company will be transferred to Easton, Pa, and all correspondence formerly addressed to 32 Liberty street, New York, should be addressed to Easton.

It is proposed to organize a stock company with a capital of $100,000 to purchase and operate the frog, switch and crossing department of the Carlisle (Pa.) Manufacturing Co. It will be called the Carlisle Frog & Switch Co. Superintendent N. W. Boyd of the frog, switch and signal department is at the head of the new company.

The Horseheads Bridge Works at Horseheads, near Elmira, N. Y., owned and operated by E. A. Perkins & Co., were burned April 20, the loss being about $18,000. The company did a large business in highway bridge building.

The Rodger Ballast Car Co., of Chicago, has just completed an equipment of 60 ballast cars and one distributing car for the Lake Erie & Western for use on its Northern Ohio Division. These cars are 34 ft. long, of 30 tons capacity, and are fitted with air brakes and M. C. B. automatic couplers. They are built entire of Southern yellow pine and oak and have a running board around the entire top of the hoppers, giving each car a capacity of 25 cu. yds. of ballast. The same company has also completed 100 ballast cars for the Butte, Anaconda & Pacific to be used in hauling the copper ore from the mines at Butte to the reduction works at Anaconda, Mont. This company has been using 250 Rodger ballast cars in this service for the past two years and has adopted them as standard for ore and coal cars.

Operations were resumed in the car and blacksmith departments of the Carlisle (Pa.) Mfg. Co.'s shops Monday on an order for cars for the Geiser Company, Waynesboro, Pa.

The Q & C Company has moved its manufacturing department to a large new building at Chicago Heights, Ill., the present factory on Shields avenue, Chicago, having long been inadequate to meet the demand for the company's specialties. With the facilities now provided the company will be able to fill promptly all orders. The general offices remain in the Western Union Building at Chicago.

Royal C. Vilas announces that he now controls the National locomotive electric headlights, and he is prepared to promptly fill all orders for the headlights. They are in use on a number of roads in this country.

The General Agency Co., of New York, dealers in railroad supplies, now at 32 Park Place, will be located on the first floor of 168 Broadway after May 1 next.

Mr. A. O. Norton, of Boston, manufacturer of the Norton ball bearing jack and "sure drop" track jacks, reports a satisfactory amount of orders for the track jacks. Mr. H. A. Norton, who is at present representing the firm in Mexico, is meeting with good success in introducing the track jacks on Mexican railroads.

After May 1 the New York office of the Otis Steel Company Limited, of Cleveland, O., will be located in the Manhattan Life Building, 66 Broadway.

The Boyden Brake Co., of Baltimore, has received the order for the air-brake equipment of the new locomotives building for the Seaboard Air Line at the Pittsburgh Locomotive works. The equipment will include driver and tender brakes and the pneumatic train signal. The Boyden Company is also furnishing the freight car equipment for the new cars which the same company is building at its Portsmouth shops.

The Weeks Automatic Car Coupler Co. of Lamar, Mo., has been incorporated by P. C. Weeks, C. W. Bozarth, H. R. Houston, J. S. Moore and others.

The Fox Solid Pressed Steel Co. has removed its general offices to the Fisher Building, 281 Dearborn street, corner of Van Buren street, Chicago.

Iron and Steel.

At a meeting of the steel billet association held in Pittsburgh, April 24, George S. Griscom was chosen commissioner. Mr. Griscom was at one time receiver of Moorhead, McCleane & Co.

The Penn Steel Casting & Machine Co. has received an order for 800 tons of steel castings from the Baldwin Locomotive Works for 60 locomotives being built for the Russian Government by the Baldwin works.

The Delaware Iron Co., of New Castle, has just shipped

200 tons of poles for electric railroads at Cairo, Egypt, and Cape Town. South Africa, and the rest of the order, which is for 1,000 tons, will be shipped in a few days.

New Stations and Shops.

The officers of the Canadian Pacific and of the city government of Montreal have finally settled their differences in regard to the proposed transfers of land between the company and the city, in connection with the construction of the proposed east end station, and the building will now be commenced immediately. The plans for this station were completed in the summer of 1893. The company needed a large tract of land for the station and yards, and it agreed to transfer to the city certain lands which it owned and which were desired for park purposes in return for land owned by the city at the proposed site of the new station, the city also contributing $150,000. These transfers were agreed to in general, but minor differences have delayed the work until the present time. The new station will be a very handsome structure about 60 ft. × 300 ft., four stories in height, and will be connected with the Windsor street station, the main station of the company in Montreal, by an elevated road through the city about two miles long. The architect of the building is Mr. Bruce Price, of New York City.

The officers of the Cleveland, Cincinnati, Chicago & St. Louis recently informed the city authorities of Urbana, O., that the division shops of the company, now located at that place, would be removed to another location unless the city transferred to the railroad company about 55 acres of land needed for shop purposes and $35,000 in cash, concessions which, it was estimated, about equalled others offered by other towns to secure the location of the shops. All but $1,500 of the $35,000 asked has been raised by the townspeople, and the land needed will also be granted by the city. It is likely now that the railroad will begin work immediately on an important extension of its shops at Urbana.

Division Engineer C. S. Bihler, of the Northern Pacific has completed the plans and specifications for the buildings for the car shops at Spokane, Wash. The contract for the foundations was let last fall. The contract will call for the completion of the shops by next fall. The buildings will consist of a 22-stall roundhouse, a machine shop, wood-working shop, blacksmith shop, sand house, oil house and an office building. They will be constructed of brick and stone.

The Chesapeake & Ohio and the city authorities of Richmond have about completed the negotiations which have been pending for some time concerning the street rights and other privileges to be allowed the railroad company in connection with the new station and extended improvements about to be made in the city. Work will soon begin. The improvements will cost about $2,000,000.

Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, till May 22 for building a steel-framed construction and repair shop at the Naval Station, Port Royal, S. C. Specifications and blank forms of application will be forwarded upon application to the Bureau, or the Commandant of the Naval Station, Port Royal.

The old shops of the Southern Railway, near the site of the newly erected shops, at Atlanta, Ga., were burned on Saturday of last week together with 20 odd cars. The loss is about $25,000.

The Southern Railway has decided to build a new 3-story brick passenger and freight station at Salisbury, N. C, the junction of the North Carolina and the Western North Carolina lines, and where the large new machine shops are now also being erected.

The Erie road is building a new roundhouse at Kent, O., and improving its coal-handling facilities at the same point.

The officers of the Boston & Maine state that bids will be received immediately for the new shops at Concord, N. H., which have been talked of for a long time.

The Westinghouse Air Brake Co., is building an addition 60 ft. × 500 ft. to the foundry department at Wilmerding, Pa., which will be completed during June.

The Baltimore & Ohio has recently purchased about 25 acres of land just east of Ellwood City, Pa., near Pittsburgh, the land being necessary to carry out the proposed extension and remodeling of the car shops located there.

The Denver & Rio Grande is to build an addition to the shops at Salida, Col., and remodel portions of the plant. Much new machinery will be put in; and it is expected that when the improvements are completed the capacity of the shops will be doubled.

Track Elevation in Chicago.

The Chicago Board of Aldermen has passed the ordinance providing for the elevation of the tracks of the Pittsburgh, Cincinnati, Chicago & St. Louis, the Chicago & Northwestern and the Chicago & Northern Pacific on Rockwell street. This is a north and south line in the Western part of the city. The elevation is to begin at a point about the center of Ogden avenue, on the line of the Pittsburgh, Cincinnati, Chicago & St. Louis. Subways are to be constructed at West Twelfth street, Polk street, Harvard street, Taylor street, Lexington street, Flournoy street, Harrison street, Congress street, Van Buren street, Jackson Boulevard, Adams street, Wilcox avenue, Monroe street, Madison street, Warren avenue, Washington Boulevard, Park avenue, Lake street, Fulton street and Washtenaw avenue. The elevation above the plane of the existing roadbed will average 10 ft. 6 in. About 20 amendments to the ordinance were presented and voted down, but a final one, requiring the work to be done by "union labor," working eight hours a day, was carried.

Some Exhibits at the Electric Show.

Steam power for the National Electric Exhibition which will shortly open in New York City is to be furnished by a battery of Root water tube boilers, supplying 500 H. P., made by the Abendroth & Root Manufacturing Co., of New York. With these will be used the anthracite coal stoker made by the Wilkinson Manufacturing Co., of Bridgeport, Pa. The coal will be handled to the stokers by a Hunt conveyor and the Hunt conveyor will also carry away the ashes. The feed water will be supplied by a Worthington pump driven by a Crocker-Wheeler electric pump motor. Feed water regulating devices from the Abendroth & Root Company will be used, starting the pump automatically when the water level in the boiler falls and stopping when it is raised to the required height. The draught will be regulated by the Locke damper regulator made in Salem, Mass. Thus the entire working of the steam plant is made automatic, and it is proposed to put a woman in charge, to add to the impressiveness of the lesson. In the main steam piping will be used, valves made by the Chapman Valve Manufacturing Co, of Indian Orchard, Mass., and in the steam line the Foster reducing valve will be used to reduce the pressure from 125 lbs., which will be used in the first engine, to 90 for the other engines. The Foster Engineering Company will also show a new automatic safety valve in the main steam pipe near the boiler. The Ashcroft Manufacturing Company will show the Edson recording gages Safety valves by the Consolidated Valve Company of New York and Bridgeport will be in use. The engines shown will be the Phœnix, the Ball & Wood, the Straight Line, the Harrisburg, the Watertown, the Payne, the McEwen, the Weston belted), the New York Safety (belted), the Case, the Sheppard and the Woodbury.

THE SCRAP HEAP.

Notes.

The shops of the Seaboard Air Line at Raleigh, N. C. were burned on April 23. Loss, $70,000.

The New York state law requiring the Manhattan Elevated to light its passenger cars by gas or electricity has been passed, and signed by the Governor. It requires 40 per cent. of the company's cars to be equipped with suitable lamps for one year, 40 per cent. more within two years, and the remainder within three years.

Several bridges have been carried away by the recent high water in the Provinces of Quebec and Ontario. In addition to those we mentioned last week the bridge over the Chaudierie River at Ste. Marie Blance, Que the one over the Kaministiguia at Stanley, Ont., and those at St. Bridget, Beauchemins, Guerin and Lapances and Therrin have been swept away.

Division Superintendent Mansfield, of the Panhandle, has offered an annual pass to the farmer (adjacent to the railroad) who does the most to beautify his place in a given time. Mr. Mansfield at first thought of offering a money prize, but thinking of the farmer's inherited weakness for passes, he offered the one thing above all others that would influence these people to brush up. The yeomen along Mr. Mansfield's road are working night and day for that annual, and it is safe to say that, when the time for awarding it arrives not a loose straw will be found along this division of the Panhandle.—*Chicago Inter-Ocean.*

Prosperity of English Railroads.

The marked improvement in business in England during the past year is well known. The participation of the railroads in this prosperity is the subject of an article in the *Railway News* (London) which first sets forth the depression for the preceding five years, the lowest point of which was reached in 1893, the year of the disastrous coal miners' strike. The changes since 1889 are shown by the falling off in dividends as follows:

Company.	Dividend for 1889.	Dividend for 1894.	Decline.
Great Eastern	2¾	1⅝	— 1⅛
Great Northern	4⅞	3½	— 1⅜
Great Western	6¾	5¼	— 1½
London, Brighton & South Coast	7⅛	6	— 1⅛
London & North Western	7⅜	6¼	— 1⅛
London & South Western	6	6¼	+ ⅛
Manchester, Sheffield & Lincoln	3⅜	¾	— 2⅝
Midland	6	5¼	— ¾
North Eastern	7¼	5⅞	— 1⅜
South Eastern	4⅞	4⅛	— ¾

The dividends did not begin to improve in 1895 until the last half of the year, but then the increase was decided and overcame the decrease of the first half. Since the beginning of 1896 the improvement is strong throughout the list, and this is shown by the following prices of shares:

Stock.	Price Jan. 2, 1896.	Price April 17, 1896.	Advance.
Caledonian ordinary	141	157½	13½
" deferred	51	61¼	10¼
Great Eastern ordinary	87¾	1 01⅛	13⅜
Great Northern deferred	50¾	56	5¼
Great Western ordinary	160½	169¼	8¾
Lon., Brighton & S. Coast def.	163¾	175¼	9½
Lon. & North Western ordinary	187	196½	9½
Lon. & South Western ordinary	200	206	6
Man., Sheff. & Lincoln ordinary	44	53	9
Midland ordinary	154½	159¾	5¼
North Eastern ordinary	163½	177¾	14¼
North Eastern deferred	85½	99	14½

Legislators and Pecuniary Interest.

In the House of Commons the motion for the second reading of the London & North Western Railway Bill was carried by a majority of 77. Mr. Lloyd George then moved that the vote of Sir William Houldsworth be disallowed, on the ground that, as a director and large shareholder in the London & North Western, he had a direct substantial pecuniary interest in the bill. A point of some difficulty is involved, and this has been referred to a committee to draft some general rule for the guidance of the House. No member can sit on a committee on a private bill in which he is interested. A private bill committee, however, is in the nature of a judicial tribunal, and disqualification is obviously inapplicable to the House as a whole. No man who has a contract with the Government by himself or his firm can sit in the House of Commons at all. Yet, as Mr. Courtney pointed out during the debate, there are members of the House on the boards of companies which carry the Government mails. The only limitation laid down by Lord Sidmouth and Lord Colchester to the doctrine that pecuniary interest disqualifies is that the interest must be peculiar to the members themselves, and not shared by them with the public. It is certainly advisable to have some explicit rule on the subject of votes by directors of railway and other companies. Replying to a question on this subject in the House of Commons Mr. Balfour said: "I have no means of inquiring as to the shares which honorable members may have in public companies. In the second place, if the honorable gentleman's intention is to exclude from the committee every member of the House who may have pecuniary interest in the debates in the House, we evidently cannot stop at shareholders in public companies, but must include land owners and occupiers of land, publicans and sinners and not only the shareholders of railway companies, but those customers of railways who desire by the action of this House to get their freights reduced."—*Railway News (London).*

Veterans' Association of the Pittsburgh Division of the Pennsylvania.

The sixth annual reunion of the Veterans' Association of the Pittsburgh Division of the Pennsylvania Railroad was held at Altoona on April 23, about 300 of the 425 members of the association being present. The proceedings included a business session in the afternoon of Thursday, Mr. Robert Pitcairn, President of the Association, presiding. There were reports from various committees and the officers of last year were re-elected. In the evening there was a banquet at the Logan House, Mr. Pitcairn acting as toast master. Among the officials of the Pennsylvania attending the re-union were Messrs. T. N. Ely, F. D. Casanave and J. M. Wallis, of the mechanical department, and Superintendents D. M. Watt and Joseph Park. Andrew Carnegie, a member of the association, was present, and another member, not now in railroad service, was the Rev. John Brunton, who came from Pueblo, Col., to attend the meeting. He was a locomotive engineer on the Pennsylvania in 1852 and is now in his seventy-first year.

The Engineers' Club.

Last Monday evening a reception was held at the house of the Engineers' Club, 10 West Twenty-ninth street, New York City, in celebration of the seventh anniversary of the opening of the Club House. Although this club is but little more than seven years old it has a membership of 641—344 resident and 297 non-resident—and is in thoroughly sound and easy financial condition. The President is Commodore Charles H. Loring, Chief Engineer, United States Navy, retired; the Vice-Presidents are Mr David Williams and Mr. John Thomson, the Treasurer Mr. A. C. Rand, and the Secretary Mr. G. W. Bramwell. The past presidents are Messrs. James A. Burden, Charles Macdonald, J. F. Holloway and John Stanton.

Fairly Profitable.

The experience of the Pneumatic Tyre Company has been of a highly satisfactory character. At an extraordinary meeting of the company held in Dublin on Monday it was stated that the directors had received an offer for the undertaking amounting to £3,000,000 in cash, and that a deposit of £100,000 had been lodged which would remain the property of the company if the proposed purchase fell through. At the outset of the company the capital amounted to £22,500, of which £7,500 went to the vendors; but in nominal capital and in premiums the shareholders have in all paid £260,000. Upon this investment they have received £658,123 in dividends, etc., and if the sale goes through they are to be paid £2,887,500, making in all a return of £3,545,623 on cash contributions amounting to £260,000. The intention of the syndicate which has taken the matter in hand is to form a new company to continue and extend the business, present shareholders being given the right to subscribe for a third of the new capital at par.—*The Economist.*

Philadelphia Subway and Tunnel.

Sealed proposals will be received till May 12 for doing away with all grade crossings on the line of Pennsylvania avenue and Noble street The work includes the subway and tunnel with ventilating conduits, retaining walls and bridges, temporary and permanent track with interlocking signals; the reconstruction and underpinning of buildings and other work. Also freight and engine houses and a repair shop, commercial coal conveyor and locomotive coaling station, a hydraulic lift and an electric crane. Proposals for the work must be made upon the printed forms and be accompanied by a certificate that a bond has been filed in the Department of Law, also a certified check to the order of the City Treasurer for two per cent. of the work proposed for. Security to the amount of 50 per cent. of the contract must be given for the guarantee of faithfully executing the work, and in addition a penal bond for the protection of the sub-contractors. Plans and specifications may be examined at the City Hall, and copies obtained by depositing a check as a guarantee of their return in good condition. Further information may be obtained from Thomas M. Thompson, City Hall, Philadelphia.

LOCOMOTIVE BUILDING.

The Lehigh Valley has just issued specifications for building 25 freight locomotives.

The Georgia & Alabama will shortly order a number of additional locomotives. The contracts will probably be for six engines, three for freight service and three for passenger service.

At the locomotive repairing department of the Pennsylvania shops in Allegheny five class R and one class M freight engines are being rebuilt. During the winter, these shops have been very busy on repair work, and many engines have been rebuilt.

A new passenger engine built at the shops of the New York, Chicago & St. Louis at Stony Island, Chicago, has just been put in service on that road. The engine was built from the designs of Mr. John Mackenzie, Superintendent of Motive Power. It weighs in working order 100,300 lbs. The cylinders are 18 × 24 in., and the driving wheels 61 in. The boiler is of the wagon top type with crown bars and extension front. The firebox is 70 in. long, 47¾ in. wide and 83½ in. high. The total heating surface is 1,512 sq. ft.

CAR BUILDING.

The East Louisiana road has just ordered eight new passenger coaches.

The Central of Georgia will build 200 new freight cars during the summer at its shops at Savannah.

The Philadelphia & Reading is building 100 hopper bottom cars and 50 box cars at its shops at Reading, Pa.

The Florida East Coast road is preparing specifications for about 200 box and flat cars, and bids for the construction of this equipment will be invited shortly.

Thirteen passenger coaches are being built at the Altoona shops of the Pennsylvania to take the place of those burned in the recent fire in Philadelphia. Orders for more coaches are expected to follow this first order soon.

Bids will be received by the trustees of the New York and Brooklyn Bridge until May 10 for from eight to 20 passenger cars for the bridge railroad. Specifications may be obtained at the Engineer's office, 179 Washington street, Brooklyn.

Six new mail cars, from the Barney & Smith Manufacturing Company, have just begun running between Oakland and Ogden over the Southern Pacific. These cars are 68 ft. long over platforms and weigh about 43 tons each. The interior is finished in cherry.

The Cincinnati, Hamilton & Dayton has just put in service a number of new parlor cars to run between Cincinnati and Detroit. These cars were built by the Barney & Smith Car Company, and are similar in general dimensions and appearance to the cars now used by the company. They have the Janney-Buhoup couplers and platforms and are lighted by Pintsch gas The interior finish is in quartered oak.

The Receivers of the Philadelphia & Reading, in presenting their petition to the United States Court, for approval by the court, of the recent orders for equipment, gave the following statement of prices bid for the cars, which included 1,000 coal. 25 refrigerator, 250 gondolas and 250 box cars; 1,000 coal cars, at $575.83 per car ($575,380), delivery July and August, 1896; 25 refrigerator cars, at $892.83 per car ($22,320.75), delivery prior to May 15, 1896; 250 gondola cars, at $475.82 per car ($118,955), delivery prior to Sept. 30, 1896; 250 box cars, at $607 83 per car ($151,957.50), delivery July and August, 1896. Payment for the cars is to be made by an arrangement with J. P. Morgan & Co., who, for a commission of 2½ per cent. advance the Receivers about 90 per cent. of the cost of the equipment, to be secured by a loan thereon, and to be payable in 60 monthly instalments, bearing 6 per cent. interest.

BRIDGE BUILDING.

Allegheny, Pa.—Plans for a new bridge over Woods Run have been prepared by W. C. Wilkins, City Engineer. The bridge will extend from Davis avenue to Riverview Park, and will cost $25,000. It will be of iron, 140 ft. long and 90 ft. high.

Belair, Md.—The Baltimore & Lehigh Railroad Co. has let the contract for a steel bridge of 123-ft. span over Deer Creek to the Maryland Steel Co.

Boonville, Mo.—The Boonville & Howard County Bridge Co. has been incorporated with a capital of $3,000, to build a bridge across the Missouri River, and a contract has been made with A. J. Tullock, of Leavenworth, Kan., to make the preliminary soundings.

Boston, Mass.—City Engineer Jackson, is preparing plans and estimates for the proposed bridge from Cove street, Boston, to Foundry street and Dorchester avenue, South Boston. The estimated cost is $300,000.

Bryan, Tex.—Bids will be received till May 15. by the Brazos River Bridge Co., for building a bridge of 490 ft. span across the Brazos river. Bids must be accompanied by a certified check for $1,000 on some local bank. G. S. Parker is secretary.

Cleveland, O.—The county commissioners have adopted a resolution to issue $10,000 additional bonds to complete the bridge over the Chagrin River. This makes a total of $50,000 which has been appropriated for this bridge.

Del Norte, Col.—Press reports state the Riverside highway bridge, the Phillips and Haney bridges, the South Fork, or Patten bridge and the Gibbs bridge have been destroyed by the ice.

Falmouth, Me.—It is stated that $2,500 has been voted to be raised to replace the bridge recently carried away by the high-water and $800 to build the abutments 4 ft. higher.

Fort Madison, Ia.—Bids will be received until June 2 for the construction of all iron and combination bridges for the year. Address the Chairman of the Board of Supervisors, Fort Madison, Ia.

Macon, Ga.—Bids will be received until May 29 by the Commissioners of Bibb County for building an iron bridge across the Ocmulgee River. The bridge will be of two spans of 170 ft. each with two viaducts of 60 ft. each. The contractor will be required to give bonds in double the amount of his bid, with securities for the faithful performance of the contract. W. G. Smith is Clerk.

Milford, Kan.—The Missouri Valley Bridge Co., of Leavenworth, Kan., has been awarded the contract for building an iron bridge 400 ft. long. Other bids were submitted, as follows: Wrought Iron Bridge Co., Canton, O., $7,129; Farnsworth & Blodgett, Kansas City, Mo., $7,100; F. Lucas, Huntington, Ind , $7,609; Geo. E King Bridge Co., Des Moines, Ia., $7,100; Canton Bridge Co., Canton, O., $6,935; Wisconsin Bridge Co., Milwaukee, Wis., $6,995; Toledo Bridge Co., Toledo, O , $7,018; Dildine Bridge Co., $7,090; Groton Bridge & Mfg. Co., Groton, N. Y., $7,131; and Kansas City Bridge Co., Kansas City, Mo , $7,348.

New Haven, Conn.—The bridge committee last week opened the bids for the substructure of the Grand Avenue drawbridge. But the contract was not let. The proposals had called for either granite or sandstone, and on finding the cost of granite to be about $8,000 the greater, some of the committee thought that sandstone should be used. There was also lack of uniformity in the bids which were as follows: Sparks & Evans, Philadelphia, sandstone, $60,457.25; pivot on piling, $55,926.95; coffer dam, $62,490.51. Granite, $68,057.25; pivot on piling, $63,526.95; coffer dam, $70,090.51. C. W. Blakeslee & Sons, New Haven, sandstone, $64,094 27; granite, $75,374.52; pivot, by pneumatic sinking, sandstone, $71,632.02; pivot on piling, $60,132 02. Connor Bros., New Haven, sandstone, $67,015.98; pivot on piling, $61,576.48. Sooy-smith & Co., three piers, pneumatic process, sandstone, $73,447.50; granite $76,847 50. R. Redfield & Son, New Haven, $74,716.17; pivot on piling, $69,550.97. John J. Geary, Stony Creek, granite, $104,929.87; pneumatic center, $112,199.92.

New York, N. Y.—Mayor Strong has approved the bill providing for a bridge over the tracks of the N. Y., N. H. & H. R. R. between Pelham avenue and Kingsbridge road.

Philadelphia.—Of the appropriations made by the Department of Public Works $400,000 has been set aside for building the four bridges over railroads recommended by the department.

Pittston, Pa.—The Delaware, Lackawanna & Western Railroad will replace the wooden bridge over the Susquehanna with a double-track steel bridge.

Richmond, Ind.—Bids will be received till May 18 for building a 635-ft. steel highway bridge over White Water River. H. L. Weber is City Engineer and R. A Howard, County Engineer.

Rome, N. Y.—The contract for the substructure of the canal bridge at Thomas street has been awarded to T. F. Louis Faas & Co., of Utica, N. Y., for $2 955, and the superstructure of the same bridge to the King Bridge Co. of Cleveland, O , for $1,939. The substructure for the bridge at Garden street has been let to Brummel, Kamp & Lane, Syracuse, N. Y., for $2,090, and the superstructure to the Havana Bridge Works of Montour Falls, N. Y., for $3,184.

Royalton, Minn.—The bridge over the Mississippi, which was carried away by high water week before last, will be rebuilt immediately.

Selma, N. C.—The Southern Railway Co. will replace the wooden bridge across the Neuse River with an iron one. It is to be completed by June 1.

West Fairview, Pa.—Nelson & Buchanan, of Chambersburg, Pa., have been awarded the contract for building the iron bridge over the Conodoquinet River to replace the present covered wooden one.

Westmoreland, Kan.—Bids for erecting a 45-ft. span iron bridge have been received as follows: Missouri Valley Bridge & Iron Works, Leavenworth, Kan., $520; Wrought Iron Bridge Co., Canton, O., $495; King Bridge Co., $527; Blodgett & Co , Kansas City, Mo., $525; Youngstown (O.) Bridge Co., $540.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

New York Central & Hudson River, 1¼ per cent., payable May 15.

Rome, Watertown & Ogdensburg, 1¼ per cent., guaranteed by the New York Central & Hudson River, payable May 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alloway & Quinton, special, company's office, corner Delaware and Federal streets, Camden, N. J., May 2; annual, May 5.

Boonville Railroad Bridge Co., annual, company's office St. Louis, Mo . May 16.

Camden & Atlantic, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

Canada Southern. June 5.

Central of New Jersey, annual, company's office, Jersey City, N. J., May 8.

Chelsea Branch, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

Chicago & North Western, annual, company's office, Chicago, June 4.

Chicago, St Paul, Minneapolis & Omaha, annual, company's office, Hudson, Wis., June 8.

Columbia & Port Deposit, annual, company's office, Broad street station, Philadelphia, May 4

Delaware & Hudson Canal, annual, company's office, 21 Cortlandt street, New York, May 12.

Detroit, Lansing & Northern, annual, company's office, Grandledge, Mich., May 13.

Eastern Railroad in New Hampshire, annual, passenger station, Portsmouth, N. H., May 5.

Elmira & Lake Ontario. annual, company's office, 20 Whitehall St., New York City. May 7.

Freehold & Jamesburg Agricultural, annual, company's office, Delaware & Federal streets, Camden, N. J., May 5.

Grand Rapids, Lansing & Detroit, annual, company's office, Grandledge, Mich., May 13

Kansas City Elevated, annual. company's office, corner Fifth street and Virginia avenue, Kansas City, May 12.

Lake Shore & Michigan Southern, annual, company's office, Cleveland, O., May 6.

Lewisburg & Pyrone, company's office, Broad street, station, Philadelphia, May 4.

Michigan Central, annual, company's office, Detroit, Mich., May 7.

Missouri, Kansas & Eastern, annual, company's office, St. Louis, Mo.. May 16.

Missouri, Kansas & Texas, annual, company's office, Parsons, Kan., May 20.

New York & Harlem, annual, company's office, Grand Central Station, New York City, May 19.

New York, Chicago & St. Louis, annual, company's office, Cleveland, O., May 6.

Norfolk & Western, annual, company's office, Roanoke, Va., May 6.

Philadelphia & Chester Valley, annual, office of Reading Terminal, Philadelphia, May 4.

Philadelphia, Marlton & Medford, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

St. Louis & Kansas City, annual, company's office, St. Louis, Mo , May 16.

Schuylkill & Lehigh, annual, company's office. Reading Terminal, Philadelphia, May 4.

Southern Pennsylvania Railway & Mining Co., annual, office of the Pennsylvania Railroad, Broad Street Station, Philadelphia, May 4.

Turtle Creek Valley, annual. company's office, Broad Street Station, Philadelphia May 12.

West Jersey, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

West Jersey & Atlantic, special, company's office, Delaware & Federal streets, Camden, N. J., May 2.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Traveling Engineers' Association* will hold its next annual meeting at Minneapolis, Minn., commencing Sept. 8.

The *Master Car Builders' Association* will hold its next convention at Congress Hall, Saratoga Springs, N. Y , beginning June 17. The rates at Congress Hall are $3 a day for single rooms.

The *Master Mechanics' Association* will hold its next annual convention at Congress Hall, Saratoga Springs, beginning June 22.

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple. Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville. Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

Engineers' Society of Western New York.

The regular monthly meeting of the society will be held in the Library Building, Buffalo, Monday, May 4, at 8 p. m. A paper by Mr. T. A. Vander Willigen, on "The Hydraulic Lift Locks at La Louvière, Belgium, and St. Omer, France," will be read.

New York Railroad Club.

The next regular meeting of the New York Railroad Club will be held on Thursday, May 21, 1896, at 8 o'clock p. m., at No. 12 West Thirty-first street, New York City. The topic for discussion is, "Is it a Good Practice to Use Blank Drivers on Locomotives?" The discussion will be opened by Mr. L. E. Molineux of the Lehigh Valley Railroad.

National Convention of Railroad Commissioners.

The Eighth Annual Convention of Railroad Commissioners will be held at Washington, D. C., May 19. The Railroad Commissioners of all states, and state officers charged with any duty in the supervision of railroads

are invited to attend and participate in discussions. Members of former Conventions are entitled to participate in discussions. Simeon R. Billings, of Michigan, is Chairman, and Edward A. Moseley, Secretary Interstate Commerce Commission, Secretary.

Central Railway Club.

The next meeting of the Central Railway Club will be held at the Hotel Iroquois, Buffalo, on Friday, May 8, 1896, at 2 p. m. The reports are on "Car Roofs." Committee: E. A. Miller, Chairman; S. A. Crone, E. A. Mitchell, A. C. Robson, Robert Potts and T. Sills; and on "Tool Rooms in Machine Shops and Best Methods of Handling Them." Committee: S. Higgins, F. B. Griffith and John Mackensie.

The discussions will be on report of committe on "Safe Endng of Boiler Flues," report of committee on "Air Brake Testing and Inspecting Plarts," and Topical questions submitted by members.

The Engineers' Club of Philadelphia.

A business meeting of the club will be held on Saturday, May 2, 1896, at 8 o'clock, p. m., at which the proposed charter and revised form of by-laws will be in order for discussion and amendment, and they will come up for final action at the meeting of May 16.

The paper will be on "The Welsbach and other Incandescent Gas Lights," by Mr. George S. Barrows; illustrated by lantern slides.

At the meeting of April 18 there was a long discussion on the advisability of the club urging upon Congress action to make the metric system the only legal standard in the United States. A resolution to this effect was submitted to letter ballot.

Association of Engineers of Virginia.

The regular monthly meeting of the Association was held at Roanoke, Va., on April 15, with President D. C. Humphreys in the chair. The bills now pending in Congress relating to the metric system, the establishment of experimental stations at certain colleges and increasing the number of engineers employed in the navy were discussed, and the Secretary was instructed to secure by letter ballot an expression of opinion of the members of the club on these several bills.

The paper of the evening was by Prof. L. S. Randolph, of Blacksburg, Va., and discussed engineering ethics, the author urging the necessity of a written code although acknowledging that there were many difficulties in preparing and enforcing any such rules.

The summer meeting will be held at Pulaski, Va., on June 26 and 27. The details of the arrangements will be announced later.

Western Railway Club.

The Western Railway Club held its regular monthly meeting at the Auditorium Hotel, Chicago, April 21st, at 2 p. m., with about 110 members present.

The committee appointed to act on the recommendations of Mr. Pulaski Leeds in regard to lumber loading made its report, and it was decided to refer the matter to the M. C. B. Association.

Mr. F. A. Delano, of the C., B. & Q., brought up the question of indexing the proceedings of the club in the same manner as is done by the American Society of Mechanical Engineers and the American Institute of Mining Engineers. It was determined to do this.

A description of some tests made to determine the form of the exhaust jet in the stack of a locomotive in motion was given by Mr. J. F. Deems, of the C., B. & Q., and was productive of a good discussion.

A topical discussion on the pooling of engines was followed by a paper on "Railroad Ethics," which was read by its author, Mr. H. D. Judson, of the C., B. & Q. Another paper on "Locomotive Rating and Fuel" was also presented by Mr. Tracy Lyon, of the Chicago Great Western Railway.

The next meeting, to be held in May, will be the last before the summer vacation.

National Association of Local Freight Agents' Associations.

The ninth annual convention of this association will be held at the Tremont House, Chicago, on Tuesday, June 9. All members are urged to give sufficient thought to the topics to be able to give to others their ideas and experience. The topics for discussion are: 1. Seniority in Making Promotions. 2. Proposed Code of Definitions of Traffic Terms Used in Railway Accounting. 3. Should Yard Clerks be Under the Control of Agent or Yardmaster? 4. On Shipments Ordered Returned by Consignors that have Reached Destination, Should Original Bill of Lading be Demanded before Taking Action for Return? 5. Use and Misuse of Abbreviations in Billing. 6. Terminal Switching. 7. Credit vs. Cash System. 8. What is the Best Method of Keeping a Station Record of the Delivery of Solid Car Loads on Private Sidings. 9. Loading Merchandise and Miscellaneous Freight from Warehouses. 10. How Shall Errors in Delivery be Avoided so as to Effect a Correct Delivery of Freight to Consignee? 11. Should Car Service be Collected by the Car Service Association or by the Local Agents? 12 Is it Profitable or Desirable to Handle Cars of Mixed Shipments Between Factories, Warehouses and Freight Depots? Should the Service be Rendered Free? 13 What is the Best System of Checking and Loading Freight and Noting Discrepancies, Locating Cases of Wrong Loading and Overs and Shorts? 14. Interchange of Minutes of Local Freight Agents' Associations. 15. Car Accounts.

The Committee on Arrangements of the Chicago Association will issue a programme and forward a copy to each member.

The Secretary of the National Association is Jas. V. Braden, Wheeling, W. Va.

The Civil Engineers' Club of Cleveland.

At the annual meeting, on March 10, the following officers were elected: President, Chas. S. Howe; Vice-President, James Ritchie; Secretary, Forrest A. Coburn; Treasurer, Jas. C. Wallace; Librarian, A. Lincoln Hyde, and Directors, John L. Culley and Jos. C. Beardsley.

At the meeting on April 14, President Howe in the chair, there were present 57 members and visitors. The topic of the evening, "Smoke Prevention," was first taken up by Prof. C. F. Mabery, who was followed by various other members, the conclusions arrived at being that in avoiding smoke, it was necessary to have sufficient boiler, grate and stack capacity, and to have intelligent firing. Mechanical stokers and shakers were recommended as saving, both in labor and fuel.

The Programme Committee reported as follows: May 12, E. A. Sperry, Steam Engine for direct connected Electric Generators; June 9, Dr. C. O. Arey, Water Supply and Sewerage, as affected by the Lower Vegetable Organism; July 14, James Ritchie, Inspection of Structural Steel from the standpoint of the Engineer; Aug. 11, J. D. Varney, Solar Work in Land Surveying and a new Mechanical Method for doing it; Sept. 8, J. N. Richardson, a Paper on Architecture; Oct. 27, C. L. Saunders, Gas Producers and the Mechanical Handling of Fuel for same; Nov. 10, J. R. Oldham, Structural Steel of Ships: Efficiency for Repairing without diminution of Strength. 1897: Jan. 12, Prof. C. H. Short, some Problems in Street Railroading; Jan. 26, J. R. Oldham, N. A., Steamship Propulsion and Analysis of Skin Resistance at Deep and Shallow Draught; Feb. 9, Prof. C. H. Benjamin, Use of Electric Motors on Machine Tools; Feb. 26, Dr. Cady Staley, a Paper on Sanitary Engineering; March 9, Annual Meeting, Address by the President; April 13, Dr. Cady Staley, a Paper on Architecture.

Traveling Engineers' Association.

The committee on the subject for discussion at the next meeting, "Would the rating of engine loads by tons instead of by cars decrease delays and increase the efficiency of the power?" desire answers to the following questions: Do you rate your engines by number of cars or number of tons per train? What department has the rating of engines? Do you think if it was in the hands of Motive Power Department that the same number of cars or tons would be handled with less detention? Has the adoption of a tonnage system increased the train haul? How does the consumption of coal per ton compare as between the tonnage system and the assigned number of cars per train? Are running repairs of engines, under tonnage system, less than under an assigned number of cars per train? Will not tonnage rating increase earning capacity? Will there not be less doubling? In handling tonnage rating why will the train-haul vary from one to three loads? In figuring tonnage of refrigerator cars, what amount of tonnage should be allowed for ice? What is the best method of equalizing the difference between empties and loads? What is the best and quickest way of making up tonnage trains?

Any other information will be thankfully received.

Address P. H. Stack, Chairman, 1807 Seventh avenue, Council Bluffs, Iowa. The other members of the committee are J. W. Graham, Wm. Owens, A. C. Loucks, J. H. Burns.

The Committee on Sight Feed Lubricators desire answers to the following questions:

1. Are any instructions given to the enginemen in regard to the operating and care of sight feed lubricators? 2. Are these instructions printed? If so send a copy. 3. If personal instructions, by whom are they given? 4. Do you expect the engineer to stop the cup feeding when the engine is standing still? What is the limit of time standing still for this? How should this be done, by shutting oil feeds or by shutting the water valve between condenser ball and oil tank? 5. Do you clean out lubricator with lye or blow out with steam? How often do you find this necessary? 6. Is steam for your lubricator taken from turret, or by separate connection to dry steam? Which manner of connection would you recommend? 7. Do you give ⅝ in. full opening from boiler to lubricator to insure full boiler pressure? 8 Do equalizing pipes get stopped up with scale? 9. What are the principal causes of failure? 10. What material is best for choke plug, and what size of hole is allowable in same before removal? 11. Have you experienced any trouble from the so-called siphoning action when boiler was allowed to cool off? If so, was lubricator in perfect order? 12. What should be the maximum miles run to one pint of oil in perfect safety with 17 and 18 inch eight-wheel passenger engine, with 19 and 20 inch ten-wheel passenger engine, with eight-wheel freight engine, ten wheel and consolidated freight engine? 13. What is the best method of using the lubricator to supply the valves and packing with oil when they need it, and to economize oil when engine is not moving? Should cup be fed regularly when working hard the same as when shut off drifting down grade? Where should the oil pipe deliver the oil, on the top of valve into the steam inlet pipe near or at steam chest, or into dry pipe inside of boiler near back end? What difficulties do you meet with in the operation of the cups? 14. What proportion of your engines are equipped with the Nathan and Detroit lubricators? Please state if any other make is in operation on your road.

Address M. W. Burke, Chairman, Merchants' Hotel, Moberly, Mo. The other members of the committee are W. H. Gurney, I. R. Bear, C. H. Stalker and C. V. Cass.

The next meeting of the Association will be at Minneapolis, Minn., Sept. 8, 1896.

PERSONAL.

—Sir Charles Rivers Wilson, President of the Grand Trunk, sailed from Liverpool on Saturday of last week on the steamship Lucania for New York.

—Mr. A. J. Beltz, Master Mechanic of the Delaware, Susquehanna & Schuylkill road, with headquarters at Drifton, Pa., resigned that position last week.

—Mr. F. L. Sheppard, General Superintendent of the Pennsylvania Railroad Division of the Pennsylvania Railroad, is very seriously ill, at Atlantic City, N. J.

—Mr. O. Emerson Smith, of Portsmouth, Va., has been appointed Receiver of the Norfolk & Virginia Beach Road, a short line running out of Norfolk, Va.

—Mr. J. H. Veitch, of Kansas City, Division Freight and Passenger Agent of the Chicago, Milwaukee & St. Paul, died at Chillicothe, Mo., April 25, aged 37 years.

—Mr. R. W. Beckam has resigned as Auditor of Accounts of the Chattanooga Union to accept an office with Superintendent J. R. Shaler of the Panama Railroad as Auditor.

—Mr. W. A. Heister has resigned as Roadmaster of the Buffalo division of the Erie, and his successor is Mr. Dennison Fairchild, a civil engineer, formerly in the service of the Erie road.

—Mr. Richard S. Robertson, General Eastern Freight Agent of the Delaware, Lackawanna & Western, and an old officer of the traffic department of that company, has recently resigned.

—Mr. R. H. Wallace, who has been acting as General Agent of the Passenger Department of the Erie Road in Cleveland since the death of Mr. M. L. Fonts, has been given the full title.

—Mr. W. A. Meagher, recently in charge of the machinery in the mills at Nona, Tex., has been appointed Master Mechanic of the new Gulf & Interstate road in Texas, which is soon to be opened for traffic.

—Col. D. S. Wagstaff, who for the past five years has been District Passenger Agent of the Grand Trunk in Detroit, has been appointed Southern Passenger Agent for the entire system, with headquarters in Cincinnati.

—Mr. John Spencer who was elected Secretary of the New York, Susquehanna & Western at the last annual meeting September, 5, 1895, died of consumption at his home in Brooklyn, April 24. Mr. Spencer was 26 years old and was employed in the office of the Vice-President and Treasurer for several years.

—Mr. William H. Wallace has just been appointed Superintendent of the Saginaw, Tuscola & Huron road. This office was abolished about a year ago when the duties of the office were assumed by Mr. Sanford Keeler, the General Manager. Mr. Keeler has just resigned, and the office of Superintendent is re-established, that of General Manager, which was created for Mr. Keeler, being discontinued.

—Mr. William Coughlin, Division Superintendent of the Missouri Pacific from Kansas City to Omaha, with headquarters at Atchison, has resigned to become Superintendent of the middle division of the St. Louis Southwestern from Pine Bluff to Texarkana. Mr. Coughlin was formerly Roadmaster of the Missousi Pacific, at Atchison, and was appointed Division Superintendent in February, 1890.

—Mr. A. J. Cromwell, Superintendent of Motive Power of the Baltimore & Ohio lines east of the Ohio River, with headquarters at Mt. Clare, has resigned. He has been succeeded by Mr. J. N. Kalbaugh, Division Master Mechanic of the Pittsburgh division, located at Glenwood. Mr. Cromwell has been with the Baltimore & Ohio for 45 years, entering the service of the company as a journeyman machinist.

—Mr. W. A. Stinchcomb, General Superintendent of the Jamestown & Lake Erie Road, has recently resigned that position and will shortly go to Nova Scotia to take charge of the construction of the Nova Scotia Southern, a proposed line about 150 miles through the central part of the province. Mr. E. T. Haines, Vice-President of the company, will take personal charge of the management of the Jamestown & Lake Erie for the present.

—Mr. Sanford Keeler has recently resigned as General Manager of the Saginaw, Tuscola & Huron road, in Michigan. Mr. Keeler went to this road as General Manager something over a year ago, having been previously General Superintendent of the Iron Range & Huron Bay road, taking charge of the construction of that line in 1891. Before that time he had been Division Superintendent of the Flint & Pere Marquette.

—Mr. J. H. Reed has resigned as Vice-President of the Pittsburgh & Lake Erie and Chairman of the Board of the Pittsburgh, McKeesport & Youghiogheny, with headquarters at Pittsburgh, to connect himself with the new Butler & Pittsburgh Road. He will be Chairman of the directors of that company, and President of the Union Railroad, which is controlled by the Carnegie Steel Co., and connects the various plants of that company.

—Mr. Wellington Sprague has been appointed Division Superintendent of the Quebec Division of the Maine Central road and assumed the duties of the office on April 20. His headquarters are at Lancaster, N. H. He succeeds Mr. George F. Black, who has been transferred to the engineering department of the company as Assistant Engineer in charge of the maintenance of roadway and track and of bridges and buildings on the company's lines north of Portland, Me.

—Mr. J. T. Odell, Vice-President and General Manager of the New England road, was last week elected President of the Butler & Pittsburgh road, a new line in which the Carnegie Steel Company is the controlling interest and which proposes to build a line to form a new route between Pittsburgh and the Carnegie Works more particularly, to Lake Erie. The company has just been organized and it is not likely that Mr. Odell will leave the New England road for a considerable time.

—Mr. Robert B. Stanton, of Denver, who has been Consulting Engineer of the new Utah & California Railroad and has immediate charge of all the preliminary engineering work on the project, has resigned that office and it is stated will shortly leave Salt Lake City, his present headquarters, for Philadelphia to accept a position on the new water-works of that city. Mr. H. M. McCartney, Chief Engineer of the Salt Lake & Pacific, will be appointed Chief Engineer of the Utah & California.

—Mr. W. K. Thompson, Assistant Superintendent of the Canadian Pacific at Toronto, will shortly remove to St. John, N. B., having been appointed Division Superintendent of the St. John & Megantic Division. Other changes in the operating department of the Canadian Pacific recently made include the transfer of Assistant Superintendent Williams, from London to Toronto; Assistant Superintendent Jamieson, from Smith's Falls to Farnham, and Assistant Superintendent Brady, from Farnham to Smith's Falls.

—Mr. J. D. Layng has been elected Second Vice President of the West Shore road, in addition to the office of General Manager, which he has held for several years. The circular issued by President Chauncey M. Depew announcing the election of Mr. Layng to the office, states that he will have full charge of operating the road for the lessee (the New York Central). Mr. Layng, however, has practically had charge of the West Shore ever since it was completed. He is also the second Vice-President of the Big Four.

ELECTIONS AND APPOINTMENTS.

Arkansas City, Blackwell & Southwestern.—The incorporators of this new Kansas company are J. B. Tucker, Charles Day, Blackwell, O. T.; A. J. Seay, William Grimes, Kingfisher, O. T.; T. W. Eckert, George S. Hartley, A. A. Newman, Howard Ross, C. L. B. Brown, S. T. Alton, Arkansas City, Kan.

Baltimore & Ohio.—B. B. Jackson has been appointed Division Freight Agent, with headquarters at Staunton, Va. The position has just been created. Mr. Jackson was formerly agent at Chicago of the Kanawha Dispatch line.

Bangor & Aroostook —Frank C. Plaisted has been appointed Cashier of the Company in place of H. W. Blood, resigned. His office will be at Bangor, Me.

Butler & Pittsburgh.—This new company was formally organized in the offices of the Carnegie Steel Company at Pittsburgh on April 24. J. T. Odell, of Boston, was chosen President, William N. Frew Vice-President, T. M. Given Treasurer, and R. A. Frank Secretary. The Board of Directors elected includes Andrew Carnegie, William N. Frew, T. H. Given, F. S. Smith, J. T. Odell, R. A. Franks and T. M. Carnegie, Jr.

Cleveland, Akron & Columbus.—Frank H. Alfred has been appointed Roadmaster to succeed John Roach, who recently resigned to go to the Erie road. Mr. Alfred has been Chief Clerk in the office of Chief Engineer Sheldon, of the Columbus, Hocking Valley & Toledo, but resigned several months ago to accept a similar position on the Denver & Rio Grande.

Cleveland Terminal & Valley.—S. T. Everett has been elected Vice-President, Auditor J. Bartol Director and Secretary, and F. E. Rittman Treasurer of the

company. These four offices were formerly held by Henry F. Keim, who resigned a few months ago.

Etna & Montrose.—The incorporators of this Pennsylvania Company are: Hugh Kennedy and Jas. R. Darragh, of Sharpsburg, Pa.; Geo. P. Painter, Jacob Painter, Jr., Henry Chalfant, John W. Chalfant and W. C. Steele, of Allegheny, Pa., and G. A. Chalfant, of Etna, Pa , who is President.

Georgia & Alabama.—J. A. McDuffy has been appointed General Eastern Agent, with headquarters at New York. J. W. Walker has been selected as Southwestern Agent at New Orleans.

Grand Trunk.—The recent changes in the mechanical department are announced by circular as follows: Mr. Herbert Wallis, Mechanical Superintendent, having resigned, that office is abolished.

Mr. Frank W. Morse is appointed Superintendent of Motive Power, and will have charge of the construction and maintenance of motive power, and all matters pertaining to that department. Headquarters at Montreal, P. Q.

Mr. William McWood is appointed Superintendent of Car Department, and will have charge of the construction and maintenance of passenger and freight car equipment. Headquarters at Montreal, P. Q.

W. H. Rosevear has been appointed General Car Accountant, with office at Montreal, P. Q.

International & Great Northern.—J. B. Bartholomew having resigned the position of Assistant Freight Agent of this company to accept duties elsewhere, that office has been abolished.

Iowa Central.—T. I. Wasson has been appointe l General Auditor of the road, to succeed Norman Cableman, deceased.

Maine Central.—Wellington Sprague has been appointed Division Superintendent of the Quebec Division, with headquarters at Lancaster, N. H.

Nashville & Knoxville.—At last week's stockholders' meeting in Lebanon these directors were re-elected: A. J. Crawford, H. A. Crawford, James P. Crawford, John P. Crawford and L. S. Hoyt.

Nashville, Chattanooga & St. Louis.—S. T. Early has been appointed Roadmaster of the Memphis & Paducah Division from Paducah to Lexington with headquarters at Paris, Tennessee. Mr. Early will have charge of all track forces and all work.

R. B. Clover has been appointed General Bridge Foreman of the Memphis & Paducah Division with headquarters at Paris, Tennessee, and will have direct charge of all the employees in the Bridge department.

New Orleans & Northwestern.—The annual meeting of stockholders was held in the company's office at Natchez, Miss., April 20. They elected the following d rectors: Chas. Hyde, Chas. L. Hyde, L. K. Hyde, F. Del Hyde, A. H. Foster, E. S. Drake, Jas. W. Lambert, Geo. W. Koontz, A. G. Campbell.

The directors elected the following officers: Chas. Hyde, President; F. Del Hyde, Vice-President; Chas. L. Hyde, Second Vice-President; Jas. W. Lambert, Secretary; J. M. Barkley, Treasurer.

Saginaw, Tuscola & Huron.—Sanford Keeler has resigned as General Manager, to take effect May 1. The President, Wm. L. Webber, assumes the title of that office.

William H. Wallace has been appointed Superintendent, with office at Saginaw, Mich.

Wyllys C. Ransom has resigned as Auditor of this Company, and Louis F. Ohland has been appointed his successor.

Staten Island.—At the recent annual meeting the stockholders elected the following directors for the ensuing year: Frank S. Gannon, Joseph Tate, Charles H. Bass, August Horrmann, Kintzing P. Emmons, George F. Kreischer, James J. Winants, Louis DeJonge, Jr., C. A. Canavelle, James M. Fitzgerald, E. P. Goodwin, William King and Louis Benziger. The directors met on April 27 and elected the following officers: Frank S. Gannon, President; Joseph Tate, Vice-President, and Edward Curry, Secretary and Treasurer.

West Shore.—At a meeting of the Board of Directors of the West Shore Railroad Company, held on April 22, J. D. Layng was elected Second Vice-President, and will hereafter have charge of operating the road for the lessee as Second Vice-President and General Manager.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Allegheny & Monongahela.—Construction work was begun on this road at the headwaters of Nine-Mile Run, near Homestead, Pa. This, however, was to preserve the company's franchise, which would have expired this week if no work had been done. The company does not seem to have made arrangements to continue work any length of time. The line proposed is a short one, from Nine-Mile Creek, at Homestead, to Deer Creek on the opposite side of the Allegheny River. W. J. Hammond is President.

Arkansas Valley, Guthrie & Western.—This company has been organized to build a railroad from Fort Smith, Ark., in a westerly direction, via Guthrie, to Albuquerque The incorporators are W. P. McCoy, Watonga; William Grimes, Kingfisher; W. N. Spurlock, F. N. Greer and J. W. McNeal, Guthrie, and W. R. Hill and C. W. Turner, Muskogee, I. T.

Asheboro & Montgomery.—This road was incorporated last week in North Carolina. It will extend from Starr, a station on the Aberdeen & West End road, to Asheboro, N.C., the latter place (a large cotton mill center) being the terminus of the Asheboro Branch of the North Carolina division of the Southern. The distance is 25 miles. The building of this road will form an important connecting link, and will give the Aberdeen & West End road an outlet over both the Southern Railway and the Seaboard Air Line. Work will begin at the Asheboro end of the route probably next week, and it is intended to have the new road completed and in operation before Jan. 1.

Carolina Midland.—The contract for the extension to Batesburg and thence to Greenwood, S. C., has been let to W. B. Strang & Co., 15 Wall Street, New York, and work on the line will begin early in May. The grading machinery has already been shipped to South Carolina. The extension already contracted for will be 66 miles long, and it is to be completed to Batesburg in 90 days, and to Greenwood in 150 days. The present terminus is Sievern, S. C. The chief object of the extension isto secure good Western connections, and at Greenwood connection will be made with the Southern, the Seaboard Air Line and the Port Royal and Western Carolina roads.

Chattanooga & Gulf.—Articles of incorporation for this company have been filed at Montgomery, Ala. The proposed route is from St. Mark's, Fla., via Columbus, Ozark, Union Springs and Tuskegee, Ala., to Chattanooga, Tenn. The incorporators are T. E. Rushing, T. Gardner Foster, S. B. Matthews, Gordon McDonald, A. T. Dreyspring, J. Gindrat Winter, A. B. Garland and associates.

Chesapeake & Western.—President J. W. Reinhart announces that the first section, extending from Elkhorn, Va., on the Shenandoah Division of the Norfolk & Western westwardly through Harrisonburg, Va., on the Valley Division of the Baltimore & Ohio, to Bridgewater, Va., a distance of 27 miles, has been completed and was opened for traffic on Tuesday, April 28. The road is of standard gage, and the track is laid with an 80-lb. rail section.

Denver & Rio Grande.—George Coppell, Chairman of the directors who have just returned to New York from a trip over a portion of the road, states that the company is contemplating important improvements, which will include the standard gaging of some of the narrow-gage lines. As a result of these changes, it is believed that a large amount of new business will come to the road. The management is also considering two extensions, one in Southwest and one in Middle Colorado. These lines will not be begun until after the consent of the stockholders has been obtained, at the annual meeting in October.

Etna & Montrose.—This company was incorporated at Harrisburg, April 27, to build a road from the mouth of Pine Creek, in Allegheny County, to the town of Montrose, Susquehanna County. The length of road will be about six miles. George A. Chalfant, of Etna, Pa., is President.

Nashville & Knoxville.—At a stockholder's meeting in Lebanon, Tenn., last week, the directors were authorized to issue bonds on the entire bed at $15,000 per mile, buy new rolling stock and to build the road from Lebanon into Nashville and complete the road from Monterey to the Cincinnati Southern.

New York & Pennsylvania.—The consolidation of the Olean, Oswago & Eastern with the New York & Pennsylvania was effected at Wellsville, N. Y., this week, where a joint meeting of all the directors of both roads was held. The road at present extends from Oswego to Rexville, but will be extended north to Wellsville and also toward the coal mines of Clearfield and Cameron counties, in Pennsylvania. This new route will give both the Erie and Lackawanna lines an entrance into northern Pennsylvania.

Pennsylvania.—Engineers of the company have surveyed a route from the main tracks of the Northern Central road at Enterprise Junction, Pa., to a point one mile southwest, and work will at once be commenced on the new branch, which will reach a new coal breaker to be built by M. J. O'Boyle & Co., of Pittston, Pa.

Philadelphia & Easton. — The projectors of this road state that they have secured the right of way, and that bids will shortly be asked for its building. The road is to be 23 miles long and is to connect the Lehigh Valley line at Easton with the North Penn Road at Quakertown. B. K. Jamison &Co., of Philadelphia, are reported to be largely interested. The road would reduce the distance from Philadelphia to Easton by eight miles. It will extend from Quakertown northeasterly to Richlandtown, Pleasant Valley, Springtown, Durham and Riegelsville. From the last-named place the course of the road is in a northerly direction, along the west bank of the Delaware River to Easton. J. J. Ott of Pleasant Valley, Pa., is one of the directors.

Pittsburgh, Monongahela & Wheeling.—A new contract for the construction of this line will be awarded this week, the time limit on Joseph Giannini's contract having expired. The contract to build 25 miles of the road was awarded to Mr. Giannini last fall, it being stipulated that he must begin the work prior to March 15, but this condition was not complied with. This section begins on the eastern side of the Monongahela River, opposite Monongahela City, and crosses the river, extending to Clarkstown, in Washington County. W. G. Dacey, 40 Wall street, New York City, is President of the company.

Pittsburg, Virginia & Charleston.—The company has secured the necessary right of way through McKeesport, Pa., for its second track and has put a large force on the track-laying.

South Georgia.—This company was recently organized to build a line from Quitman, Ga., on the Plant system, northeast, 26 miles, to a connection with the Georgia Southern & Florida near Adel. J. W. Oglesby is the President and chief promoter of the enterprise. The contract for building the road has been let and work begun. Large local subscriptions have been made to the company.

Toronto, Hamilton & Buffalo.—It is expected that work will be commenced on the spur line to connect with the Grand Trunk road in Hamilton, Ont., about May 1. The length of the line would be about 1¼ miles, and the cost about $200,000.

Union Belt Line.—The Carnegie Steel Co. has purchased a river frontage in Homestead, 180 ft. square, for $15,000, which was needed to complete the right of way for the road, which will connect the Homestead, Edgar Thomson and Duquesne mills of the Carnegie company. The belt line will also be the terminus of the new Pittsburgh, Butler & Lake Erie.

Electric Railroad Construction.

Albany, N. Y.—The following new railroads have applied to the commission for certificates of necessity: The Ballston Terminal Co., to build a road between Ballston and the mills on the Kayaderosseras Creek; Plattsburg Traction Co., to extend from Plattsburg to Lake Champlain, and the Mountain Lake Electric Railroad Co., to extend from Gloversville to Mountain Lake.

Carlisle, Pa.—The Electric Railroad Co. has at last secured right of way for its road to Boiling Springs. The work has been delayed on account of opposition from property holders. A new line has now been surveyed which is about three quarters of a mile longer than the one first proposed.

Chagrin Falls, O.—The Cleveland & Chagrin Falls Electric Railway Co. has accepted the franchise granted it by the Town Council. The engineer corps of the company has completed the running of grade lines and setting of stakes over the route of the company's proposed road from Chagrin Falls to Cleveland. The company insists that cars will be running by July 4 next over the road.

Conway, Mass.—The Conway Electric Street Railway Co. has been granted a franchise to extend the road to Ashfield, a distance of about eight miles and also for an extension across the Dearfield River to connect with the Fitchburg Railroad.

Cornwall, Ont.—Work has been begun at the Grand Trunk station, on the Cornwall Electric Street Railway. A heavy "T" rail will be used, and the roadbed is to be made very substantial, as it is intended to carry the Grand Trunk freight cars from the station to the various mills and factories. An electric locomotive with four motors of 30 H. P. each will be used for hauling the freight.

Davenport, Ia.—The Tri-City Electric Co. has been incorporated to operate an electric railroad. The capital stock is $100,000, and S. C. Wheelock, W. T. Ball and S. M. Howe are among the incorporators.

Dayton, O.—The County Commissioners have granted the White Line Street Railroad Co. the right of way for 47 years over the Covington pike road.

Dundee, Mich.—The council has granted the Monroe, Dundee & Lake Erie Electric Railroad Co. a franchise through the village.

Johnstown, N. Y.—The survey for the Mountain Lake Electric Railroad has been completed and the profile and specifications made A franchise has been granted for the road, which will be 4½ miles long.

Knoxville, Tenn.—The ordinance allowing the Knoxville Electric Co. to lay tracks in East Knoxville and other parts of the city passed a second reading at the Council's meeting held recently.

Mansfield, O.—The Railroad Commissioners have granted a franchise to the Mansfield, Sullivan & Wellington Electric Railway Co. on condition that the road be completed by June 1, 1898. The company will be allowed to carry passengers, baggage, freight, mail and express. It is said to be the intention of the incorporators to build the road from Mansfield to Wellington or Grafton and to build a branch from there to connect with the Cleveland & Berea Railroad and enter Cleveland by this road.

McKeesport, Pa.—The Second Avenue Traction Co. is laying new track and making other improvements. The Glenwood power house will be enlarged and the two plants in the city abandoned. Work will soon be begun on the viaducts at Reynoldton, Dravosburg and Riverton.

Napierville, Que.—The rails for the Napierville Junction Railroad, to be built from Napierville, have been received and work will soon be commenced. Murphy & Maguire are the contractors.

Ormo, Wis.—It is stated that the town board has granted a 30-year franchise to the Oshkosh, Berlin & Ormo Electric Railroad.

Plattsburg, N. Y.—The Plattsburg Traction Co. has been granted a franchise for an electric road six miles long in Plattsburg. H. M. Pierson is President.

Port Rockland, Me.—The Rockland, Thomaston & Camden Railway Co. has decided to extend its road into Thomaston, a distance of about one mile from its present terminus.

Rochester, N. Y.—The Irondequoit & Lake Shore Electric Railroad Co. has been granted a certificate authorizing it to build a connecting road, seven miles long, between summer resorts on Lake Ontario. It is said that Ira M. Ludington will have charge of the construction and Le Grand Brown is engineer.

The council granted the Suburban Street Railroad a franchise last week for an electric road in Rochester. The only condition made was that the company pay the city $5,000.

St. Louis, Mo.—The directors of the Southern Electric Railway Co. have decided to issue $200,000 of bonds for improvements.

St. Louis County, Mo.—A petition has been filed for incorporating an electric railroad, about 25 miles long, to extend north and south across the country. Among those said to be interested are Ernest P. Bell, Mark E. Lemmon and Julius Erickson. They agree to file a bond for $100,000 and begin work within 90 days after the granting of the franchise.

San Diego, Cal.—The Citizens' Traction Co. has been incorporated with a capital stock of $100,000 by G. B. Kerber, of Cincinnati, O.; G. C. Arnold and others, of San Diego. The proposed road is about five miles long.

Tiffin, O.—The Tiffin & Fostoria Electric Street Railway has been sold to Samuel R. Sneath. The road was commenced several years ago and about $40,000 was spent on the construction.

Watkins, N. Y.—The State Railroad Commissioners have granted the application of the Watkins & Havana Surface Railroad Co. for an increase of its capital stock from $50,000 to $300,000. The company was only recently granted a certificate to build the road, but now proposes to build 11 miles more than was first intended.

Woonsocket, R. I.—The Woonsocket Street Railway Co. has petitioned for a franchise for an electric railroad in Woonsocket.

GENERAL RAILROAD NEWS.

Atlantic & Pacific.—The Joint Reorganization Committee of the Atchison has appointed a sub-committee to confer with the Atlantic & Pacific bondholders in regard to retaining the road as an Atchison line. The committee, it is said, has received an offer from the bondholders to sell to the Atchison for 60 per cent. in general mortgage bonds and 50 per cent. in preferred stock; but it is understood that the Atchison thinks that a probable purchase could be made between 40 and 50 per cent. in preferred stock.

Central of New Jersey.—The company reports earnings for March as follows:

	1896.	1895.	1891.
Gross earn	$934,049	$1,039,848	$895,258
Oper. exp	661,471	633,544	662,056
Net earn	$272,578	$406,304	$233,202
Per cent. exp. to earn	70¾	60⅝	70¾
Net earn. 3 months	841,827	874,643	678,769

Chicago, Burlington & Quincy.—The earnings of all lines for March were as follows:

	1896.	1895.	1894.
Gross earn	$2,742,141	$2,517,235	$2,856,989
Oper. exp	1,675,768	1,644,668	1,708,602
Net earn	$1,066,373	$902,567	$1,148,387
P. c exp. to gross	61	64⅛	59¾
Charges	880,000	872,955	.....
Surplus	$186,373	$29,612	.....
Three months:			
Gross earn	$7,504,162	$7,082,675	$8,182,383
Net earn	2,781,531	2,251,428	2,871,557
Surplus	141.530 (Def.)	367,434	.....

For purposes of comparison the gross and net earnings in 1894 are also made to include those of the Chicago, Burlington & Northern. This line did not report changes, so further comparisons are not possible. The combined net earnings of the two roads in March, 1893, were $1,216,792; in 1892, $1,251,286; in 1891, $974,592.

Chicago, Milwaukee & St. Paul.—The company reports earnings for March as follows:

	1896.	1895.	1894.
Gross earn	$2,749,354	$2,256,237	$2,515,797
Oper. exp	1,634,556	1,220,700	1,451,454
Net earn	$1,114,798	$1,035,537	$1,064,343
P. c. exp. to gross	59⅜	54	57⅝
Nine Months:			
Gross earn	$28,452,379	$20,873,227	$24,427 061
Net earn	10,544,807	7,604,651	8,8 8, 26

The company's net earnings in March, 1893, were $1,048,526; in 1892, $1,074,006; in 1891, $753,098; in 1890, $745,496; in 1889, $782,949; in 1888, $420,215.

Grand Rapids & Indiana.—The published notice of the decree of foreclosure of this road gives June 10 as the date of the sale.

Jacksonville, Louisville & St. Louis.—Judge Allen, of the United States Court, at Springfield, Ill., has granted a decree for the foreclosure of a mortgage for $172,000, and entered an order for the sale of the road at Jacksonville, Ill., at a time to be hereafter set. The road is 110 miles long, from Jacksonville to Centralia. It was for some time operated as part of the Chicago, Peoria & St. Louis, but the bondholders refused to accept the terms of reorganization of that company.

Northern Pacific.—Judge Jenkins, in the United States Court in Milwaukee, has signed the decree for the sale, under foreclosure, of the consolidated mortgage of the road. The sale will be made in Superior, Wis., by Special Master A. L. Carey on a date yet to be announced, and the property will be bought in for the Reorganization Committee. The course of the reorganization has thus far been unusually rapid. Messrs. J. P. Morgan & Co. announced the terms of the plan on March 16, and when the time expired for receiving deposits on April 23 the firm had in its control 99 per cent. of the bonds called for, besides over $12,000,000 of the first mortgage bonds, and largely over a majority of both classes of stock.

Omaha & St. Louis.—At a meeting of the bondholders held in New York last week it was voted to accept the proposition of a syndicate believed to represent one of the connecting roads. The syndicate will pay 75 per cent. in the 4 per cent. gold bonds and 25 per cent. in the stock of a new company that will take over the present property and franchises. The stock of the new company will be placed in escrow for five years, or until the payment in bonds is made. It will also pay off the indebtedness of the present company, amounting to about $500,000.

St. Joseph & Grand Island.—The committee, of which Frederic P. Olcott is Chairman, representing the holders of the defaulted first mortgage bonds of the company, has prepared a plan for reorganization, and a meeting of the holders of the certificates issued by the Central Trust Company for the first mortgage bonds deposited under the agreement of June 1, 1894, will be held for the purpose of acting upon the plan of reorganization at the office of the Central Trust Company on May 19.

Southern.—The earnings for March were as follows:

	1896.	1895.	1894.
Gross earn	$1,553,947	$1,510,695	$1,562,471
Op. exp. and taxes	1,078,496	1,060,907	1,145,632
Net earn	$454,451	$449,788	$416,839
P. c. exp. to earn	70	70	73⅛
Nine months:			
Gross earn	$14,984,318	$13,915,286	$12,738,133
Net earn	4,838,801	4,482,097	3,865,114

Wabash.—Earnings for March are reported as follows:

	1896.	1895.	1894.
Gross earn	$1,002,362	$1,015,427	$1,007.539
Oper. exp	691,197	728,468	747,729
Net earn	$311,165	$286,959	$259,810

Electric Railroad News.

Atlanta, Ga.—Judge Chandler has decided that the Consolidated railroad must relay the tracks on Capitol avenue, between Richardson and Bass streets, and resume the former schedule by May 2. The company tore up the rails on the night of February 28, as the line did not pay.

Buffalo, N. Y.—An action has been begun by the Municipal Ownership League against Mayor Jewett and the Buffalo Traction Co., asking judgment of the supreme court to declare the Traction Co.'s franchise void, and to restrain the company from constructing or operating any railroad in Buffalo under its franchise, or to sell the franchise.

Hagerstown, Md.—The Hagerstown Street Railway Co. has been trying for some time to obtain the right of way from the Williamsport Turnpike Co., over that road, and has offered $6,000 for the privilege. The Turnpike Co. asks $8,000. The electric company is now trying to obtain a control of the Turnpike stock and has secured an option on 500 shares belonging to the Washington County National Bank at $8 per share. The par value is $20 and there are 1,000 shares.

New York.—In the Appellate Division of the Supreme Court, last week, a decision was handed down denying the application of the Empire City Traction Co., for an order directing the Railroad Commissioners to issue a certificate to that organization, which filed its articles of association on December 30, 1895, for the purpose of building a railroad, beginning at the Hudson River, in 145th street, and running thence to the Harlem River, and also a road through Ninety-sixth street, Columbus avenue, and along the Transverse Road through Central Park, and in other streets. The Court holds that the consent of the local authorities must contain the condition that the franchise shall be sold at public auction to the highest bidder.

Richmond, S. I., N. Y.—The Staten Island Electric Railroad Co. has filed a mortgage for $2,000,000, in favor of the Mutual Life Insurance Co., to raise money for extending the company's lines.

Waterbury, Conn.—The Waterbury Traction Co. has announced that it will not extend its road to Waterville, as it is alleged that the city has imposed unjust conditions.

TRAFFIC.

Traffic Notes.

The Burlington road recently carried a whole dry goods store from St. Louis to Kansas City. There were 32 carloads, all in one train.

The total shipments of lumber by railroad from the State of Washington by the Northern Pacific, Great Northern and Canadian Pacific railroads in March were 762 cars as against 423 in March, 1895. The total number of cars of shingles was 1,220, as against 1,097 in March, 1895.

The Philadelphia & Reading Coal & Iron Company announces an advance in the selling price of 25 cents a ton on all sizes of coal. The new prices at Port Liberty are: Hard white ash egg, $3.85; stove, $4; chestnut, $3.75. Schuylkill red ash egg, $4; stove, $4.40; chestnut, $4. Lykens Valley egg, $4.85; stove, $5; chestnut, $4.75.

Lake and rail rates on grain to Boston and New England points, from Chicago and Milwaukee are to be for the present, on corn 9 cents a bushel, and on oats 5¾ cents, with the understanding that the Chicago lake line agents be authorized to adjust these through from time to time during the season in accordance with any material change in current lake rates to Buffalo. On ex-lake grain east of Buffalo, in carloads, not taken under the established through rates, to New England points, the following rates are made: Wheat, 8 cents a bushel; corn and rye, 7¾ cents; oats, 4 cents.

Northwestern Flour Output.

The three northwestern flour making centers, Minneapolis, Duluth and Milwaukee, have made in the three months of the present year, 3,893.855 barrels of flour, of which Minneapolis made 2,862,640, Duluth-Superior 619,000, and Milwaukee 412,215. The Minneapolis grist, 2,862,640, was in comparison with 1,722,890 barrels in the same period the year before: Duluth-Superior's 619,000 was in comparison with 306,340 barrels for the corresponding time in 1894. Minneapolis shipped in the 90 days 739,325 barrels against 448,570 the year before; Duluth-Superior, 173,320 barrels against 50,965 in the same time a year ago. There are now at docks at Duluth 250,000 barrels waiting shipment to the East by water. Mills at all the points are grinding at high speed, and the product for the next few months promises to be very large. In the seven months that have passed since the beginning of the crop year the Minneapolis mills have ground about 2,250,000 barrels more than the average for the same period for the preceding highest years in its history. In no week of the 90 days have they ground less than 200,000 barrels, and in some have reached a total of 255,000 barrels. The indications are that in the crop year the mills of the city will grind not less than 12,500,000 barrels, or 3,000,000 more than ever before, and for which not less than 55,000,000 bushels of wheat will be required. A new feature of the northwestern wheat market is the fact that much flour is being shipped into the southwestern states, where the local product has been short. Were the people of that section acquainted with the use of spring wheat flour there would be very large shipments to that section from spring wheat points.

It is predicted that there will be wheat shipments from Duluth by lake in May of not less than 10,000,000 bushels, the largest movement ever had from any grain center.

Import Traffic at Newport News.

The Chesapeake & Ohio Railway Company, in looking about for an extension of its foreign traffic, entered into business relations last fall with the United States Shipping Company (Funch, Edye & Co., New York agents). The Union Line, Virginia service, with semi-monthly sailings from Newport News to Hamburg, was then established, which service is under the control of the Hamburg-American and Union lines. These two lines practically hold the traffic between America and Hamburg.

The steamer Albano has just discharged 600 tons of import freight at Newport News and a gradual development of this import traffic is being actively sought. The United States Shipping Company has also kept up regular monthly departures for Leith and Bristol, and it is announced that arrangements have been completed with the Chesapeake & Ohio by which the United States Shipping Company will continue semi-monthly sailings from Newport News to Rotterdam and Amsterdam; also sailings to Glasgow, Dublin and Belfast, during the season, as the trade may demand.

By this new arrangement the United States Shipping Company controls all the direct export through traffic over the Chesapeake & Ohio Railway from Newport News, excepting to London and Liverpool, to which ports the railway company has its own service, the Chesapeake & Ohio Steamship Line.—*Journal of Commerce*, New York.

The Joint Traffic Association.

The Board of Managers has ordered that flour at seaboard terminals shall hereafter be stored free not more than 20 days, or if on the docks 10 days. After the expiration of the free time the charge for storage is to be 3 cents per barrel per month. Where flour is unloaded for inspection and has to be put back into the car the charge will be $5 a car. The free time at Philadelphia and Baltimore is to be 10 days. It appears that heretofore the rules have been loosely enforced and much flour has been stored for months without charge.

The arguments in the suit of the Government against the Association were concluded before the Circuit Court in New York City last week, the final argument for the defense being by Hon. Edward J. Phelps. Written arguments are yet to be presented by the counsel on both sides, but it is expected that the court will give a decision before the summer recess.

Movement of Grain to the Gulf of Mexico.

The causes of the movement of corn during the past winter to New Orleans and Galveston, and some statistics of the traffic, are discussed in a statement, printed in Western papers, which it is said Chairman Midgley, of the Western Freight Association, has sent to the roads in his association.

Mr. Midgley does not believe that the shorter haul from the grain-producing territory to the Gulf of Mexico has had much to do with the loss of shipments to Atlantic ports, but attributes the diversion to shortage in the cotton crop, which induced ocean carriers to secure cargoes of corn by offering extremely low rates.

"Foreign ships in large number came expecting to secure cargoes of cotton, but that crop was a comparative failure in Southwestern States In the anxiety to secure return tonnage, the ocean carriers solicited corn at prices unprecedentedly low. That condition continued throughout the season from Galveston, New Orleans, Port Royal and as far North as Norfolk, Va. Consequently shipments of grain via those ports from Kansas and Southern Nebraska attained startling proportions.

"The gross movement of corn from the territory last described during the five months ending with March, 1896, exceeded 20,000 carloads. A conservative average of the weight of each car would be 35,000 lbs., indicating a total, in bushels, of 12,500,000. Out of a total of 17,853 carloads, forwarded from Western territory during the months of November, December, January and February last, 9,642 carloads were exported via Galveston and New Orleans, and only 2,070 carloads were consigned to Atlantic ports. Of the latter there were no considerable shipments to any port north of Norfolk, Va. Although 2,593 cars were carried to Chicago, the bulk thereof was unloaded into elevators, pending the opening of lake navigation.

"As the Illinois Central carries considerable grain from its stations north of Cairo to New Orleans it is assumed the total receipts of corn at that port during the five months ending with March, 1896, exceeded 12,000 carloads. The trunk lines were utterly unable to compete with the Gulf rates. The routes to the South were enabled to reach tidewater at rates from Kansas and Missouri River points which, if applied eastward, would have carried the grain little beyond a meridian drawn through Chicago. When the grain arrived at Galveston, New Orleans or Port Royal, ocean charges were available which compared favorably with those obtainable from North Atlantic ports.

Chicago Traffic Matters.

CHICAGO, April 29, 1896.

After a session in Chicago for three days the executive officers of the trans-Missouri roads have agreed to again put on sale the 10-ride party tickets at two cents a mile, but to restrict their sale to legitimately organized parties. It is said that the intention is to deny the rate to scalpers.

Western scalpers have been completely blocked in the manipulation of the 2,000 mile books by the placing of the redemption of the covers of the books in the hands of Chairman Caldwell, and passenger officers express marked satisfaction with the new rule.

Officers of the standard eastbound lines are considerably exercised over the decision of the Board of Managers giving the weak roads the right to apply the differential principle to excursion and special business, and some of them talk of having the question referred to the board of arbitrators.

Eastbound rail and lake rates are somewhat unsteady, and a meeting of the lake and rail managers, east and west, has been arranged for in New York May 5, to consider the matter.

The revised trans-continental freight rates, which were to have gone into effect May 1, have been called off indefinitely on account of insurmountable differences that have arisen between the different roads over divisions of the through rates. The present trans continental rates are to be continued in effect, and it is predicted that the new association, recently organized, will be dissolved.

Aldermen and city, county and state officers have been hit by the Brown decision. Chicago roads are now refusing free transportation to these persons right and left on the ground that the railroads can afford to take no chances with the Interstate law. There is weeping and wailing in the political camp over the abolition of their pet privilege.

Chairman Caldwell, of the Western Passenger Association, has ruled that at points where local associations are maintained, all applications for half rates on the ground of charity must hereafter be approved by the chairmen of the local associations.

The total receipts of live stock at Chicago over the principal Western roads for the week ending April 25 amounted to 5,262 carloads. The quantities carried by each road were (cars): Burlington, 1,453; Northwestern, 1,069; St. Paul, 754: Rock Island, 611; Illinois Central, 458; Alton, 279; Wabash, 267; Santa Fe, 196; Great Western, 185; Wisconsin Central, 34, and Monon, 33. The total eastbound shipments of live stock for the same week amounted to 1,420 carloads, against 1,364 carloads for the preceding week.

Eastbound freight rates continue to be well maintained. The lake lines are taking two-thirds of the grain. Total shipments via water last week amounted to 178,533 tons, of which 175,350 tons were grain. Total rail shipments last week, not including live stock, amounted to 61,899 tons, compared with 61,690 tons for the preceding week, an increase of 209 tons, and against 61,408 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO APRIL 25.		WEEK TO APRIL 18.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	5,132	8.3	5,576	9.0
Wabash	5,313	8.6	5,131	8.3
Lake Shore & Mich. South.	2,269	13.4	8,698	14.1
Pitts., Ft. Wayne & Chicago	9,071	14.7	9,206	14.9
Pitts., Cin., Chi. & St. Louis.	7,668	12.4	6,558	10 6
Baltimore & Ohio	5.159	8 3	4,866	7.8
Chicago & Grand Trunk	5,715	9.2	7,504	12.2
New York, Chic. & St. Louis	4,797	7.7	4,988	8.1
Erie	7,266	11.7	6,732	10.9
C., C., C. & St. Louis	3,509	5.7	2,431	4.1
Totals	61,899	100.0	61,690	100.0

Of the above shipments 4,183 tons were flour, 28,694 tons grain and millstuffs, 8,862 tons provisions, 7,926 tons dressed beef, 1,724 tons butter, 1,322 tons hides, and 5,347 tons lumber.